federal register

WEDNESDAY, MAY 3, 1978
PART III

CONSUMER PRODUCT SAFETY COMMISSION

MINIATURE CHRISTMAS TREE LIGHTS

Proposed Safety Standards

[6355-01]

CONSUMER PRODUCT SAFETY COMMISSION

[16 CFR Part 1208]

MINIATURE CHRISTMAS TREE LIGHTS

Proposed Safety Standard

AGENCY: Consumer Product Safety Commission.

ACTION: Proposed rule.

SUMMARY: The Commission proposes a consumer product safety standard for miniature Christmas tree lights and similar miniature decorative lights in order to eliminate or reduce unreasonable risks of injury from electrical shock and fires that the Commission has preliminarily determined are associated with the lights. The Commission also proposes for public comment recommendations regarding materials, labeling, and provisions to address special hazards to children presented by plugs and connectors of the lights.

DATES: (1) The Commission proposes that the standard be applicable to all miniature Christmas tree lights manufactured after December 1, 1979.

(2) Written comments on the proposal must be received by the Commission by July 3, 1978.

(3) Interested persons will have an opportunity to make an oral presentation of data, views, or arguments on June 7, 1978 at 9:30 a.m. Those wishing to make oral presentations should notify the Office of the Secretary (202-634-7700) by May 31, 1978. A summary or copy of testimony is to be submitted to the Office of the Secretary by June 2, 1978.

(4) The time during which the Commission must either publish a final rule or withdraw this proposal is extended to March 15, 1979.

ADDRESSES: Written comments should be submitted to the Secretary, Consumer Product Safety Commission, Washington, D.C. 20207. All material which the Commission has that is relevant to this proceeding, including any comments that may be received on this proposal, may be seen in, or copies obtained from, the Office of the Secretary, 3rd Floor, 1111 18th Street, NW., Washington, D.C. 20207. The oral presentation will be conducted in the Commission's 3rd floor hearing room, 1111 18th Street, NW., Washington, D.C.

FOR FURTHER INFORMATION CONTACT:

Carl W. Blechschmidt, Office of Program Management, Consumer Product Safety Commission, Washington, D.C. 20207, 301-492-6557.

A. Background

In this document the Commission proposes a comprehensive standard to address the unreasonable risks of injury from electrical shock and fires that the Commission has preliminarily determined are associated with miniature Christmas tree lights and similar miniature decorative lights. The proposed standard is comprehensive and complete as a result of the many ways in which these products can result in electrical fire and shock. Although the proposed standard contains many performance tests and many requirements, a large number of these requirements and tests can be met by manufacturers by using components that are made of certain known, available materials and are built to certain existing specifications. Therefore, for purposes of complying with the certification provisions of section 14(a)(1) of the act (15 U.S.C. 2063(a)(1)), the Commission believes that manufacturers will be able to base certification for miniature Christmas tree lights, in large part on certification of components by component suppliers. (See Section H of this preamble for a more comprehensive discussion of certification.)

Since its formation in 1973, the Consumer Product Safety Commission has received reports of incidents and injuries due to electrical shocks and fires associated with miniature Christmas tree lights and similar miniature decorative lights. In 1974, a number of manufacturers voluntarily undertook recall of certain decorative lighting as a result of the reports received at that time and the encouragement of the Commission's staff.

The Commission's decision to initiate the standard development proceeding for miniature Christmas tree lights and similar miniature decorative lights, as a result of the shock and fire hazards associated with these products, was based primarily on the CPSC 1975 Christmas Decorative Light Survey and technical analyses of Christmas light products. The 1975 Christmas Decorative Light Survey involved Commission inspection of manufacturers, importers and major retailers of miniature Christmas tree lights to identify hazardous products. Based on information obtained from this survey, the Commission was made aware that defects such as exposed live electrical conductors in miniature Christmas tree light products could very likely lead to hazardous situations. For example, when a miniature Christmas tree light string with an exposed electrical conductor, such as a bare wire or a dislodged lampholder contact, is plugged into a standard receptacle outlet, the probability that a person will contact a live part and receive a dangerous electric shock is significantly higher when compared to a miniature Christmas tree light string with no such exposed electrical conductor.

The Commission also has other information about injuries associated with miniature Christmas tree lights and similar miniature decorative lights that indicates a need for remedial action, including:

1. Reports of in-depth investigations of injuries, conducted by the Consumer Product Safety Commission (CPSC).

2. National Electronic Injury Surveillance System (NEISS) surveillance data.

3. CPSC Bureau of Epidemiology Special Report: Christmas Tree Lights—August 1976.

4. CPSC Bureau of Epidemiology Special Report—Christmas Tree Lights—December 1976.

5. Engineering Analysis of Miniature Christmas Lights with Regard to Safety Hazards, by the CPSC Bureau of Engineering Sciences—December 20, 1976.

6. Fire Marshal's reports—Dallas, Tex. (1969-1975).

7. Statistics furnished to the Commission by the National Fire Protection Association.

8. Information obtained from the International Association of Electrical Inspectors and originally furnished by electrical inspectors in 63 jurisdictions (1973-1974).

9. CPSC 1975 Christmas Decorative Light Survey.

Copies of all these sources may be obtained from the Office of the Secretary.

After considering the foregoing information, the Commission preliminarily determined that the following unreasonable risks of injury are associated with miniature Christmas tree lights and similar miniature decorative lights:

1. *Shock hazards.* Shock hazards can be caused by direct contact with exposed live electrical conductors or by contact with an intervening conductive object (such as metallic tree ornament or accessory) that is in contact with the exposed conductor. The following are examples of characteristics of these lights which can create shock hazards:

a. Bare wire exposed where the wire enters lampholders (sockets) or plugs.

b. Plug and receptacle fittings that readily come apart.

c. Exposed lamp leads.

d. Cracked lampholders.

e. Lampholder contacts which come out when the bulb is removed, thereby exposing the live contacts.

2. *Fire hazards.* Fire hazards can be caused by certain characteristics of the subject lights. The following are examples of characteristics of these lights that can create fire hazards:

a. An exposed conductor which shorts to a grounded object, thereby causing arcing and/or excessive heating of flammable materials. The short

may not trip the circuit breaker or blows the circuit fuse in time to prevent a fire caused by the lights because the short may be intermittent or may not draw sufficient short-circuit current. The conductor can be exposed due to the features explained in the description of shock hazards in items 1 (a), (c), (d), and (e) above.

b. A flammable grade of thermoplastic material that becomes heated by abnormal current flow, defective lamps or other characteristics of these lights that result in excessively high temperatures. This class of material melts when heated and can flame. Melting can result in exposure of live parts, or molten, burning material dripping on tree branches, paper, carpets, or other flammable material near the lights.

c. Wire without proper overcurrent protection. Wire smaller in size than No. 20 American Wire Gauge (AWG) can overheat under short circuit conditions before the house wiring branch circuit overcurrent protective device can open. Wire smaller than No. 20 AWG is commonly used on the subject lights.

On the basis of the above information the Commission preliminarily determined that a consumer product safety standard is necessary to eliminate or reduce the specified unreasonable risks of injury associated with miniature Christmas tree lights and similar miniature decorative lights.

The Commission received information about two existing voluntary standards which are relevant to miniature Christmas tree lights and similar miniature decorative lights:

a. Underwriters Laboratories Inc. (UL)—"Standard for Christmas Tree and Decorative-Lighting Outfits—UL 588" (13th edition, November 15, 1974 revised December 30, 1974 and February 4, 1976).

b. National Ornament and Electric Lights Christmas Association (NOEL)—"NOEL Standard Midget Sets, September 16, 1975."

The voluntary standards include many beneficial features. It appeared to the Commission, however, that application of these standards would not eliminate or sufficiently reduce the unreasonable risks of injury associated with the miniature Christmas tree lights and other miniature decorative lights. The Commission believed that requirements in addition to those set forth in the voluntary standards were reasonably necessary to adequately protect the public against these risks of injury. In addition, the Commission recognized that it may be difficult to ensure continuing compliance with the voluntary standards, especially since the miniature Christmas tree light industry is composed mainly of small manufacturers located outside the United States.

As the result of these concerns, the Commission began the proceeding to develop a consumer product standard applicable to miniature Christmas tree lights by publishing a notice in the FEDERAL REGISTER of March 31, 1977 (41 FR 17154). In that notice, which was published in accordance with section 7(b) of the Consumer Product Safety Act (15 U.S.C. 2056), the Commission invited interested persons to submit an existing standard as a proposed consumer product safety standard or to submit an offer to develop a recommended safety standard. In addition, the Commission made specific observations about the adequacy of the voluntary standards to address the identified hazards and suggested promising approaches for provisions that could be used in a standard to reduce the risks of injury.

In response to the March 31 FEDERAL REGISTER notice, the Commission received two offers to develop a recommended standard applicable to miniature Christmas tree lights, from Underwriters Laboratories Inc., Melville, N.Y., and from National Consumers League, Washington, D.C. The Commission also received a submission as an existing standard from the National Ornament and Electric Lights Christmas Association (NOEL), New York.

The Commission subsequently accepted the offer of the National Consumers League (NCL), 1028 Connecticut Avenue, NW., Suite 522, Washington, D.C. 20036, to develop a consumert product safety standard applicable to miniature Christmas tree lights. On June 30, 1977, the Commission published in the FEDERAL REGISTER (42 FR 33354) a notice of acceptance of the offer, a summary of the terms of the offer, and an invitation to interested persons to participate in NCL's development of the recommended standard.

The period for NCL's development of the recommended standard ended on November 16, 1977. On that date NCL submitted material, including the following:

(1) NCL's proposed safety standard, (2) a conceptual rationale, which describes the basis on which the offeror's reviews panel determined the content of the standard submitted to the Commission, (3) a report which provides a section by section technical rationale for the specific language of the standard presented by the offeror to the Commission, and (4) an Economic Analysis Report.

The Commission's staff conducted an extensive evaluation of the standard which NCL recommended. It was necessary to conduct additional tests to determine the feasibility and effectiveness of some of the recommended requirements to address the electric shock and fire hazards associated with the product.

Copies of all materials which the Commission has considered during this process may be obtained from, or inspected in, the Office of the Secretary, 3rd Floor, 1111 18th Street NW., Washington, D.C. 20207.

In the FEDERAL REGISTER of January 16, 1978 (43 FR 2185), the Commission extended by 75 days the time allowed it to either publish a proposed standard or withdraw the notice of proceeding. The Commission extended the time because of the need for further development of one test in the proposed standard, the need to resolve several technical areas where the Commission staff and offeror may disagree, and the need for additional time to include packaging and labeling requirements in the proposal. In the FEDERAL REGISTER of April 5, 1978 (43 FR 14322) the Commission further extended by 30 days the time allowed it to either publish a proposed standard or withdraw the notice of proceeding. The additional extension was necessary in order to allow for review of this complex and lengthy document. The time period for publishing the proposed standard or withdrawing the notice of proceeding expires May 3, 1978.

As a result of its consideration and evaluation of the recommended standard submitted by NCL, the Commission has determined that some changes and additional requirements were necessary in order to reduce risks of injury from electrical fire and shock. In addition, the recommended standard was re-written to provide additional technical clarity for the requirements and to put the standard in a form suitable for publication in the Code of Federal Regulations. Therefore, the standard proposed below differs from the recommended standard submitted by the offeror. The major changes, and the reasons for the changes are discussed in this preamble.

B. THE PROPOSED STANDARD

The standard which is proposed below is designed to reduce or eliminate the unreasonable risks of injury that the Consumer Product Safety Commission has preliminarily determined are associated with miniature Christmas tree lights.

The specifications of the standard will be Subpart A of Part 1208. In the interests of clarity, tests constituting an integral part of the standard have been placed in Subpart B. At Subpart C, the Commission has included recommendations concerning materials and provisions to address special hazards to children presented by plugs and connectors as well as recommended labeling. Although these provisions are recommendations rather than requirements and are not part of the standard, the Commission has includ-

ed them in the the proposal for reference and welcomes comments on these recommendations. The Commission intends to add compliance provisions (including a certification rule under section 14 of the CPSA) in the future. These will be set forth as Subpart D.

For the provisions of the standard recommended by NCL which the Commission has proposed in Part 1208, the Commission, except as noted below, adopts the rationale for these provisions that was submitted to the Commission by NCL. The rationale for the changed and additional provisions of the proposal is given below in the discussion of the requirements of each section of the standard. The proposed Part 1208 will be enforced using the U.S. Customary units for length, force, etc. that are given in the part. However, for convenience, the Metric equivalents are also given.

Subpart A of the proposed standard consists of 10 sections covering the following subject matter:

Sec.
1208.1 Purpose, Scope, and Application.
1208.2 Effective Date.
1208.3 Definitions.
1208.4 Abbreviations.
1208.5 Materials.
1208.6 Wiring and Assembly Requirements.
1208.7 Component Requirements.
1208.8 Overcurrent Protection.
1208.9 Lamps and Lampholders.
1208.10 Packaging and Labeling.

(The effective date of the proposed standard is discussed at section G of this preamble.) An explanation of the scope of the proposal and the technical provisions of the proposed standard (§§ 1208.5-1208.10) is given below.

At subpart B, the standard contains 29 tests to reduce the identified risks of injury associated with minature Christmas tree lights. A brief summary and explanation of these tests is also given below.

SCOPE OF THE PROPOSAL (SECTION 1208.1(B))

The requirements set forth in the proposed standard for Miniature Christmas Tree Lights, 16 CFR Part 1208, apply to lighting units intended for use with Cristmas trees or other Decorative applications. As defined at § 1208.3(i), miniature Christmas tree lights are lighting units which (1) have lamps or lampholders electrically connected by wires in series or in combinations of series path, (2) are equipped with or intended to be used with lamps that dissipate four watts of power or less per lamp when the product is connected to a 120 volt rms source, and (3) are intended to be supplied electric power from a nominal 120 volt receptacle. Strings of lamps or lampholders which are sold as part of rigid decorations, such as wreaths or frames, are covered by the standard. In addition, a lighting unit meeting these requirements would be covered by the standard even if it contains additional electrical elements other than lamps, such as switches, or an additional lamp or lamps which dissipate more than four watts of power.

MATERIALS (1208.5)

Section 1208.5 of the proposed standard is one of several sections in the standard designed to protect consumers from electrical fire and shock hazards that may result from contact with improperly or insufficiently insulated electrical conductors. The requirements are based on the function of the insulating material, since the function of the material is a significant factor in determining the likelihood of injury resulting from failures of the material. Section 1208.5(a) of the proposal divides insulating materials into three categories, and prescribes requirements for materials in each category.

The first category, Class X, is for parts of the lighting unit that do not directly contact, enclose, or support electrically live parts. Examples of these parts are shades, diffusers, reflectors, simulated needles, leaves, and supporting or decorative frames. Section 1208.5(a)(1) requires that these materials pass the Decorative Part Downward Burning Rate Test, at § 1208.37, to ensure that they are not highly flammable. Their proximity to the electrical circuit which is a potential ignition source, is the reason for the test. These parts are usually decorative in nature, and could propagate a local flaming condition into a major conflagration if highly flammable. The Decorative Part Downward Burning Rate test distinguishes materials which have rapid flaming characteristics as provided in § 1208.37. Class X materials must also pass the Cascade Failure Simulation Test, at § 1208.29, and the Short Circuit Simulation Test, at § 1202.28. These tests evaluate the overall performance of the lighting unit under stress conditions that may be encountered while in use. The Cascade Failure Simulation Test and the Short Circuit Simulation Test simulate what might occur, for example, in a situation where a short or fault occurs and decorative parts ignite.

The second and third categories, Classes Y and Z, are for materials which contact or are relied upon to enclose or support electrically live parts.

The requirements of § 1208.5(a) (2) and (3) applicable to Class Y and Z materials are intended to ensure that materials which contact or are relied on to enclose or support electrically live parts do not deteriorate or lose their effectiveness as barriers (1) between the potentially dangerous, available electrical energy and the consumer, (2) between the available electrical energy and the surrounding objects which may be electrically conductive and grounded, and (3) between electrically live parts of different polarity which could short together. Class Y materials are insulating materials contacting live parts in instances where the electrical energy is limited by fuses or similar devices. Examples of these materials are lamp bases, lampholders, and certain shades and diffusers that are integrally molded as part of the lamp bases. Class Y materials are not required to be flame retardant, since the materials are used with limited-energy live parts.

The recommended standard submitted by NCL distinguished Class Y and Class Z materials based on the normal operating current of the circuit. The proposed standard distinguishes Class Y and Z materials based on the maximum current rating of the overcurrent protective device. The purpose of this change is to ensure that flammable materials are not used as insulation for electrical components except where the electrical energy is limited by a special fuse or other protective device.

Although Class Y materials are used with limited-energy live parts, these parts can present a potential lethal shock hazard if the materials deteriorate or otherwise lose their effectiveness. Melting of the materials could occur, presenting a fire and shock hazard in use while under conditions well within the energy limit permitted by the overcurrent protection of the fuse of similar device. Section 1208.5(a)(2) requires that Class Y materials not melt to expose live parts at a temperature of 248° F (120° C) by requiring that these materials meet the Heating Test for Lamps and Lampholders at § 1208.38. The temperature value is based on readily attainable temperatures on materials near the lamps, the primary heat source. This temperature can result from the heat of the bulbs and can lead to exposed live parts when the lights are clustered. This temperature can also be obtained when an improper replacement lamp is placed in a light string. Class Y materials must also meet the tests prescribed for Class X materials at § 1208.5(a)(1), since highly flammable materials could also present a hazardous condition.

Class Z materials contact or are relied upon to enclose or support electrically live parts whose steady current flow under normal operating conditions is either not limited by an overcurrent protective device or is limited by an overcurrent protective device rated at more than 300 milliamperes. In addition, Class Z materials are insulation for wire, plugs, fuseholders, and connectors regardless of the presence of the overcurrent protective device. Class Z insulating materials on lampholders can be exposed to the energy

that fuses or similar devices rated 300 milliamperes can let through. The 300 milliampere value far exceeds the normal 100-200 milliampere current flow for a single series circuit of lights and is indicative of a serious overcurrent condition which, even when slightly exceeded, could cause localized high-heat conditions that might be incipient causes for fire and shock hazards. Section 1208.5(a)(3) requires Class Z materials to be flame retardant since the potentially available energy they insulate may otherwise cause serious overheating leading to fires and exposed live parts. These materials must pass the appropriate component flammability tests, at §§ 1208.21 and 1208.27. The test in § 1208.27 which does not apply to wire insulation, is based on a standard material flame test for judging flame retardant characteristics (Underwriters Laboratories Standard UL 94). The test for wire insulation flammability is based on a test in the Underwriters Laboratories Bulletin UL 62, dated February 24, 1978.

Additional requirements for insulating materials including wire insulation material at § 1208.7(a)(3), are contained under particular component requirements in the proposal, at § 1208.7. In § 1208.7(b)(5), insulating materials for plugs and connectors can be phenolic or urea composition thermosetting materials (materials that are inherently flame retardant and do not flow when heated) or one of the other specified Class Z materials when tested for flammability.

In § 1208.9, insulating materials used for lamps and lampholders must have insulating qualities to withstand the applied 1250 volts of the Dielectric Test for Lampholder and Lamp Assembly, § 1208.25. This value of voltage is a typical value used in material and assembly testing and is generally based on the formula: Two times the maximum voltage for the appliance (125 volts for Christmas lights) plus 1000 volts.

The proposed standard contains design specifications for conductive materials at § 1208.5(b). The Commission believes that it would be impractical to develop a performance specification for conductive materials, since extensive evaluation of the metallurgical, mechanical, electrical and chemical properties of all possible conductive materials would be needed in order to determine the appropriate tests. Copper and copper alloys (brass) have traditionally been used in appliances and are required for miniature Christmas tree lights by § 1208.5(b). Other conductors, such as iron, aluminum, gold, and silver may have serious economic or safety related drawbacks for application in miniature Christmas tree lights. Section 1208.5(b) provides that electrically live parts except for lamps and wire must be copper or have at least 60 percent copper by weight in the alloy (at least 80 percent for screw shell holders for lamps, fuses and other parts.) These percentages are consistent with minimums for electrical conductor brass of Underwriters Laboratories (UL) and industry standards.

If the Commission receives comments indicating that manufacturers wish to use another specified conductive material that does not present a hazard when used in miniature Christmas tree lights the Commission will consider changing the provisions of § 1208.5(b).

At § 1208.5(b) the proposal requires that metallized tinsel and other conductive flexible strips and threads, 0.25 in. (6.4 mm) and longer, and located within 1 in. (25.4 mm) of a lampholder, fuseholder, plug or connector shall pass the Conductive Tinsel Test (1208.41). The purpose of the test is to protect against exposed conductive materials that contact live parts from transmitting potentially hazardous current levels of 5 milliamperes and higher to people who might contact the material. Live parts are accessible to contact by strips and threads at lampholder and fuseholder openings, particularly during lamp and fuse servicing, and at plugs and connectors, particularly plug blades and receptacle openings. The Conductive Tinsel Test was added to the proposal by the Commission after a review by the Commission staff of the construction of miniature Christmas tree lights indicated the extensive use of metallized tinsel.

WIRING AND ASSEMBLY REQUIREMENTS (1208.6)

At § 1208.6 the proposal lists several requirements concerning the method of wiring of light strings in order to minimize overheating or the chance of having an exposed live part that could result in fire or shock.

Contact surfaces that are used to routinely make and break electrical circuits must be of adequate size and shape for proper mating of electrical parts in order to avoid overheating. Wire strands if used for contact surfaces would be of indeterminate or variable size and shape. This condition could result in overheating. Therefore, the proposal at § 1208.6(a) prohibits the use of wire as a contact mating mechanism.

The proposal, at § 1208.6(b) requires the wire connecting two components to be continuous and free of splices or taps. Such connections are a source of electrical failure which could lead to the exposure of live parts of other electrical abnormalities.

At § 1208.6(c), the proposal requires wire within components to be secured so that conductors are not exposed and will not become exposed when tension is applied to the wire as provided in the performance tests for components, §§ 1208.23 and 1208.35.

The proposal, at § 1208.6(d), requires, lights to be designed so that wire current ratings are not exceeded at normal operating currents. If wire current ratings are exceeded, wire insulation may be degraded, thus resulting in the exposure of live parts and possible short circuits.

Section 1208.6(e) requires overcurrent protection for wires of cross-sectional area less than No. 20 AWG to provide protection against fire when short circuit conditions exist in a light string.

Section 1208.6(f) requires each minature Christmas tree light to have an attachment plug or an add-on connector for connection to the power supply source. Miniature Christmas tree lights without attachment plugs or add-on connectors could present risks of injury from fire and shock. This requirement would eliminate the situation in which lights falling within the definition of the product covered by this standard were not provided with suitable means for electrical interface with the supply source.

Section 1208.6(g) requires that strings of lights with relatively small gauge wire (smaller in size than No. 20 AWG) must be routed in a pair of two or more wires twisted together longitudinally, except between components mounted on a frame, such as lampholders fixed in a tree-top star decoration. The purpose of this requirement is to give the wiring added strength against breakage with the resulting exposure of live parts.

The proposed standard at § 1208.6 (h) and (i) included requirements applicable to the assumbly of miniature Christmas tree lights. The purpose of these requirements is to protect consumers from exposure to live parts and shorts. At § 1208.6(h) the proposal requires separation of live parts. Opposite polarity conductors must be separated to prevent across-the-line shorts. Live parts must be separated from exposed dead metal parts in order to prevent shorts to outside dead metal parts. The parts must be separated by a spacing of at least 0.047 inch (1.19 mm) in order to adequately withstand the potential of 120 volts from bridging or tracking across the gap and creating the short.

Section 1208.6(i) of the proposal requires live parts to be insulated or otherwise enclosed so that they cannot be contacted by the probe in figure 1 of the regulation. The probe is the tip portion of a probe developed by Underwriters Laboratories to judge the accessibility of live parts based on testing a large sample of adults and children. The purpose of the requirement is to prevent persons from contacting live parts.

The recommended standard submitted by NCL did not contain requirements for separating live and dead metal parts and did not contain general requirements concerning the accessibility of live parts. However, the proposed standard includes these as general provisions in order to address fire and shock hazards that may arise where additional components, such as switches, are used.

COMPONENT REQUIREMENTS (1208.7)

The proposal at § 1208.7 includes design and performance requirements for components of miniature Christmas tree lights.

WIRE (1208.7) (a))

Wire construction requirements at § 1208.7(a) and performance tests at § 1208.13-22 are based almost entirely on tests in the Underwriters Laboratories (UL) Standard UL 62 for Types XT and FXT wire, the types of wire used in miniature Christmas tree lights that meet the UL specifications. However, the performance test for wire insulation flammability is based on UL Bulletin, Subject 62, dated February 24, 1978.

Section 1208.7(a)(1) requires copper wire to be used. Breaking strength requirements are included at § 1208.7(a)(1) in order to establish that soft annealed copper is used for flexibility and bendability. The recommended standard submitted by NCL contained a requirement that specified the use of "soft annealed" copper wire. In order to more accurately measure the desired characteristics of the wire, the Commission has added the maximum breaking strength requirement for the copper wire.

Wire gauge requirements are included at § 1208.7(a)(2) and Table B in order to ensure that the wire has proper current carrying capability.

At section 1208.7(a)(3) the proposal requires wire insulation to be composed of polyvinyl chloride or a coploymer of vinyl chloride and vinyl acetate. These are the materials for general, applicance wiring insulation, and the ones on which the performance tests are based. These materials are the only known ones presently being used for miniature Christmas tree lights. At this time the Commission believes that it would be impractical to develop performance tests for different materials. If the Commission receives comments indicating that manufacturers wish to use another material for wire insulation that does not present a hazard when used in miniature Christmas tree lights, the Commission will consider changing this provision in the final standard.

This section also provides for minimum average insulation thickness and minimum insulation thickness at any point. The purpose of these specification is to ensure adequate wire coverings for protection against shorts and contact with live parts.

The proposal, at § 1208.7(a)(4) includes requirements for the separation of parallel conductors by at least 1.5 times the required minimum average insulation thickness for a single conductor wire. The purpose of this requirement is to ensure adequate separation of conductors of parallel cord and still permit a common web of insulaltion joining the two conductors. Section 1208.7(a)(5) requires that a minimum of 0.013 inches (0.33 mm) of insulation should remain on each conductor after the parallel cord has been torn apart to separate the conductors. The purpose of this requirement is to prevent live parts from being exposed when the conductors are separated, thereby presenting a shock or shorting hazard.

The proposal, at § 1208.7(a)(6), also requires wire to pass tests for insulation resistance (1208.13), elongation and tensile strength (1208.14), heat-shock (1208.15), deformation (1208.16), cold-bend (1208.17), weathering (1208.18), dielectric (1208.19), abrasion (1208.20), flammability (1208. 21), and flexing (1208.22).

PLUGS AND CONNECTORS (1208.7 (b))

At § 1208.7(b), the proposal includes detailed design and performance requirements for plugs and connectors. These requirements are based on provisions in the Underwriters Laboratories (UL) Standard for Attachment Plugs and Receptacles (UL 498).

At § 1208.7(b)(1) the proposal includes requirements concerning the size and locations of plug blades. These requirements are included to protect consumers against electrical fire and shock hazards, since the blades must properly engage the standardized power supply recepticles of wall outlets and extension cords with a fit that does not result in exposed or misplaced live parts. Special thickness specifications are included in § 1208.7(b)(2) to protect consumers from shock where plug blades are constructed of folded-over metal stock.

At § 1208.7(b)(3), the proposal includes requirements for minimum plug body dimensions. The purposes of these dimensions is to provide an adequate distance between the blades and surfaces likely to be gripped during plug insertion and removal.

Section 1208(b)(4) includes requirements concerning the size and location of receptacle slots. These requirements are included to protect against fire and shock hazards since receptacles must properly accept the standardized blades of plugs with a fit that does not result in exposed or misplaced live parts.

As previously noted in the discussion of insulating materials, the insulating materials for plugs and connectors in § 1208.7(b)(5) are required to be certain specified flame retardant materials: Phenolic; urea; pliable, molded, natural or synthetic rubber, or a combination thereof; a polymer of vinyl chloride; or a copolymer of vinyl acetate. These materials are the only known ones presently being used. At this time the Commission believes that it would be impractical to develop performance tests for different materials. If the Commission receives comments indicating that manufacturers wish to use another material for insulating plug and connector live parts that does not present a hazard when used in miniature Christmas tree lights the Commission will consider changing this provision in the final standard.

Section 1208.7(b)(6) of the proposal requires plugs and connectors to be capable of withstanding a 75 pound force crush test, as provided in the crush test for plugs and connectors § 1208.34. This test is included since attachment components are particularly susceptible to being stepped on, thus shorting or exposing live parts or otherwise damaging the component. The 75 pound force test value is representative of accidental adult crush force values.

The proposal, at§§ 1208.7(b) (7), (8), (9), and (10), requires plugs and connectors to pass a series of mechanical tests to evaluate the integrity of these bodies to enclose live parts. Plugs and connectors must pass a wire pull test, § 1208.35, a wire insulation pull test, § 1208.36, and a blade push test, § 1208.33 and a blade pull test, § 1208.32.

The proposal, at § 1208.7(b)(11), requires electrically live parts within receptable openings to be enclosed so that they are inaccessible when tested by a probe (figure 1) that represents contact by persons to protect against electric shock.

Section 1208.7(b)(12) of the proposal prohibits openings in enclosures of plugs and connectors except for the slots of receptacles and the openings from which blades project. In addition, this section prohibits the use of parts of plug and connector bodies that are solely held together by friction. If friction only is relied on, the parts may readily come apart, exposing live parts to shorts and contact by persons. The proposal requires positive detent action, latches, screws, or other fasteners in order to hold together plug and connector insulating parts that are relied upon to enclose live parts.

The proposal, at § 1208.7(b)(13) requires receptacles to permit full insertion of the mating blades of plugs or add-on connectors. This requirement is intended to avoid the exposure of live parts. Receptacles must pass the Receptacle Insertion-Withdrawal Test, § 1208.31.

The proposal, at § 1208.7(b)(14) prohibits parts of plugs and connectors from having a temperature rise in exces of 30° C (54° F) when operated under maximum current conditions. Such a temperature rise indicates either a high resistance connection or an inadequate conductor. This condition could lead to dangerously high temperatures which could ultimately short, expose live parts, or ignite. The recommended standard submitted by NCL did not include an overload condition as part of the heating test for receptacles. The proposed standard includes an overload condition in the heating test for receptacles based on that contained in UL 498 in order to test receptacles under the conditions of making and breaking contact with a plug while under load.

Section 1208.7(b)(15) of the proposal requires plugs and connectors to pass each of the following tests: Plug and Connector Blade Pull Test (1208.32), Plug and Connector Blade Push Test (1208.33), Receptacle Insertion-Withdrawal Test (1208.31), Strain Relief Test for Plug and Connector Connections (1208.35), Security of Insulation at Plugs and Connectors (1208.36), Crush Test for Plugs and Connectors (1208.34), Temperature Test for Plugs, Connectors, and Fuseholders (1208.30), and Flammability Tests for Class Z Applications (Except Wire) (1208.27).

OVERCURRENT PROTECTION (1208.8)

The proposal, at § 1208.8, requires miniature Christmas tree lights to have fuses or similar protective devices to prevent overcurrent conditions that could cause degradation of materials leading to fire and shock hazards. The overcurrent protective devices are required for the following specific reasons:

(1) To provide protection during short circuit conditions for small size conductors (wire of cross-sectional area less than No. 20 AWG).

(2) To provide protection during short circuit conditions against bulbs rupturing and causing ignition of surrounding materials (one or more bulbs in the shorted circuit).

(3) To provide protection against melting lampholder materials in order to pass the Cascade Failure Simulation Test (§ 1208.29). The overcurrent protective device may be relied upon to provide protection when the current increases due to lamp filament burnouts, the burned out lamps passing current through the shunt feature within the miniature lamps.

(4) To meet a qualification for Class Y use of an insulating material (referred to as "close fusing") ad described in § 1208.5.

The proposal, at § 1208.8(b) establishes the method for rating an overcurrent protective device. The rated value is one-half of that which causes the device to open within 2 minutes when operated at room temperature. It may be necessary to determine that the rating of an overcurrent protective device is 300 milliamperes or less in connection with § 1208.5(a)(2), or 3 amperes or less in connection with § 1208.6(e).

The proposal, at § 1208.8(c) requires that live parts of a fuse or fuseholder not be accessible when tested by the accessibility probe (Figure 1). This requirement has been included since replaceable fuses could present a shock hazard if a person were able to contact live parts during removal and replacement of a fuse from its holder.

The recommended standard submitted by NCL assigned insulation materials used for overcurrent protection devices and their holders to Class Z, with the exception of special fuse-lamp devices and their holders. In the proposed standard at § 1208.8(d) the Commission has removed this exception and requires overcurrent protection device enclosures or holders to be Class Z materials as provided in § 1208.5(a)(3) (that is flame retardant materials) for all types and locations of the protective device. This requirement has been included since a fault that results in shorting of live parts on the supply side of any overcurrent device could cause ignition of flammable insulating materials. The overcurrent device only provides protection aganist faults which result in current going through the device element and would not provide protection against faults which do not send current through the overcurrent protection element. If special fuse lamp devices and their holders were exempt, a fault that results in shorting of live parts on the supply side of the device or holder could cause ignition of flammable insulating materials.

The proposal does not restrict the form of an overcurrent protective component. An overcurrent protective device may take the form of a special lamp that also provides fusing. Such a device should be provided with a holder which does not permit the entry of non-fuse type ordinary lamps from the string, so that the purpose of the special lamp is not defeated. This is required in § 1208.8(e).

If fuses of the string are replaceable, at least one spare fuse, of the original fuse type, must be provided in accordance with § 1208.8(f). This requirement reduces the likelihood that a consumer will attempt to defeat this important protective component by bypassing or shorting the fuse where a replacement is not readily at hand.

Section 1208.8(g) of the proposal requires overcurrent protective devices to pass each of the following tests as applicable: Temperature Test for Plugs, Connectors and Fuseholders (1208.30), Flammability Test for Class Z Applications (1208.27), Strain Relief Test for Lampholders, Fuseholders and Other Bodies Except Plugs and Connectors (1208.23) and Crush Test for Lampholders and Fuseholders (Other Than Types Which Are Incorporated in Plugs and Connectors) (1208.26).

LAMPS AND LAMPHOLDERS (1208.9)

The proposal, at § 1208.9(a), requires that lampholders must provide a spacing of not less than 0.030 inch (0.76.mm) through air and over surfaces between electrically live parts of differing electrical potential, and between electrically live parts and dead metal parts. Spacings less than the required amount result in designs wherein lampholper contacts could readily be bridged resulting in shorting conditions that could lead to overcurrent, heating, melting, fire and exposure of live parts. The proposal also requires that live parts of lampholders be recessed at least 0.20 inch from the lamp entery end of the lampholder. This minimum dimension is based on a requirement in the NOEL Standard; it is intended to isolate lampholder contacts so that the likelihood of having exposed lamp contacts (particularly extra-long lamp leads of push-in replacement lamps) when lamps are energized is reduced. In addition, the proposal at § 1208.9(b) requires that no live parts of either the lamps or lampholders be accessible before, during, or after insertion of a bulb. The purpose of this requirement is to protect live parts against accidental contact by persons. The Commission believes the opening in lampholders for inserting lamps must not permit live parts to be readily accessible to contact by a probe, especially since the lights are decorative attractions for children. As a result of the relatively small size of lamps, it is difficult to hold a lamp or lampholder and remain away from the electrical contacts. Therefore, no live parts of either the lamps or lampholders must be accessible before, during, or after insertion of a bulb.

Section 1208.9(c) refers to the Dielectric Test for Lampholders and Lamps (1208.25). As previously noted in the disussion of Materials (§ 1208.5), the Dielectric Test for Lampholder and Lamp Assembly is a measure of the insulating quality of the lampholder and lamp insulating materials. In addition, it is a check to assure adequate separation of opposite polarity live parts within the lampholder and lamp assembly to prevent shorting conditions that could ultimately lead to fire or exposure of live parts if the basic designs were inadequate.

Sections 1208.9 (d), (e), and (f) refer to performance tests (1208.26, 1208.24, 1208.23) for lampholders and lamp assemblies. See the discussion of the

tests in this preamble for additional information regarding these requirements.

At § 1208.9(g), the proposal requires that each miniature Christmas tree light must have lamps that are intended to operate at the same voltage. The purpose of this requirement is to avoid dangerously overheating lampholders. This condition results when lamps for use at one particular voltage are accidentally inserted into lampholders in circuits designed for lamps that operate at a different voltage.

The proposal, at § 1208.9(h) provides that lamps that have shunts must not be used in series circuits having fewer than 10 lamps or lampholders. Series circuits of lamps with fewer than 10 lamps are intended to operate at voltages in excess of 12 volts. If lamps with shunts were used and a lamp with a shunt had the filament burn out, the shunt would bypass the open filament to keep the remaining lamps lit. This condition would subject remaining lamps to significant overvoltage conditions which could lead to dangerous overheating, melting of materials and other degradations of the string.

The proposal, at § 1208.9(i) refers to the Decorative Part Downward Burning Rate Test (1208.37) which requires that all lampholder and lamp assembly materials meet the minimum burning rate. This is to ensure that these materials are not highly flammable.

The proposed standard at § 1208.9(l) includes a requirement to eliminate lamp bulbs that could generate extremely high surface temperatures (approaching the self-ignition temperatures of materials that may be used in and around Christmas tree lights) either when lamp bulbs are incorrectly used in light sets not designed for them, or when overcurrent conditions are present but there is not enough current to open the lamp filament or any overcurrent protective device provided. Although this provision was not included in the recommended standard submitted by the offeror, the Commission believes that it is necessary in order to ensure that fires do not result from using lamp bulbs that generate extremely high surface temperatures.

The proposed standard, at § 1208.9(m), requires lamps and lampholders to pass each of the following tests: The Cascade Failure Simulation Test (1208.29); the Short Circuit Simulation Test (1208.28); the Heating Test for Lamps and Lampholders (1208.38); the Millivolts Drop Test for Lampholders (1208.39); the Strain Relief Test for Lampholders and Fuseholders (and other bodies except plugs and connectors) (1208.23); the Secureness of Lampholder Contacts Test (1208.24); the Crush Test for Lampholders and Fuseholders (Other than types which are incorporated in plugs and connectors) (1208.26); the Dielectric Test for Lampholders and Lamp Assembly (1208.25); the Flammability Test for Class Z Applications (Except Wire) (1208.27); the Maximum Wattage Test for Lamps (1208.40); and the Decorative Part Downward Burning Rate Test (1208.37).

As a result of additional research and testing conducted by the National Bureau of Standards (NBS) for the Commission after the submission of the recommended standard, the Commission has added additional requirements to the section of the proposal concerning lamps and lampholders (§ 1208.9). The offeror's recommended standard provided that lamps and lampholders must meet the Cascade Failure Simulation (CFS) Test (at 1208.29), which is a test intended to simulate the hazardous conditions which could occur during normal and failure operating modes of miniature Christmas tree lights.

The purpose of the Cascade Failure Simulation Test is to determine whether the lamp circuit is sufficiently protected against lampholder melting and subsequent exposure of live parts from overcurrent in the lamp circuit as bulbs burn out. However, laboratory tests at NBS have indicated that melting of certain lampholders can occur either from conditions that do not result in overcurrent or that result in overcurrent that is not sufficient to blow even a fuse that is rated at or slightly above the normal circuit current.

The original CFS Test in the recommended standard submitted by the offeror did not address the following credible hazard conditions of an operating light string where temperatures could be high enough to melt certain materials but where overcurrent conditions are not significant:

(1) Improper insertion of a lamp or lamps not designed for the light string under observation (e.g. substitutions of bulbs intended for a 10 lamp light string as replacement for burned out bulbs in a 35 or 50 lamp light string) can present a hazard without an overcurrent condition if a high voltage bulb designed for a 10 lamp circuit is inserted into a 35 or 50 lamp circuit. The 35 or 50 lamp circuit, which operates at higher currents (130 ma–150 ma) than the 10 lamp circuit (100 ma), will force higher current through the high voltage lamp. This will cause the lamp to burn hotter than normal. Although there are no significant overcurrent conditions present, the hot lamp bulb could melt its own socket or another lampholder if direct contact is made. The hot lamp could also ignite external materials.

(2) Lamps bunched together for a unique decorative effect can present a hazard without an overcurrent condition. This arrangement can result in lampholder melting and later exposure of conductors without an overcurrent condition being present.

(3) Placement of decorative attachments over the lamp assembly can result in melting and exposure of conductors without an overcurrent condition being present.

(4) Variability of contact resistance at the wire-to-lampholder connection within some types of lampholders can present a hazard without an overcurrent condition. The CFS Test does not adequately test this condition because of the variability of contact resistance with contact pressure and the relatively long period of time the condition can be present before a hazardous condition materializes.

(5) Defective lamps that run hot or shunts that do not open can result in melting and exposure of conductors without an overcurrent condition being present.

In order to address these hazard areas that are not included in the original CFS test, the Commission has both modified the CFS Test, at § 1208.29 and included three additional test requirements in the proposal, at § 1208.9 (j), (k), and (l). These tests are § 1208.38, Heating Test for Lamps and Lampholders, § 1208.39, Millivolt Drop Test for Lampholders, and § 1208.40, Maximum Wattage Test for Lamps. The CFT Test cannot readily be modified to simulate those hazardous situations resulting from usage of parts not designed for the light string or from events which may require a long period of time to become apparent; hence, there is a need for a minimum component performance level as provided by these tests. These modifications to the CFS Test and additional tests are intended to reveal hazardous conditions that may be present in the absence of a significant overcurrent condition. The Heating Test for Lamps and Lampholders requires lampholder assemblies to withstand a temperature of 248° F (120° C) for 2 hours without exposing conductors. The Millivolts Drop Test for Lampholders has been included to evaluate the integrity of wire to lampholder connections and to address overheating hazards presented by contact resistance within some types of lampholders. The Maximum Wattage Test for Lamps has been included to address the hazard of bulb surface temperatures which can exceed the self-ignition point of materials used on and around Christmas trees.

PACKAGING AND LABELING (1208.10)

The proposed standard, at § 1208.10, includes packaging and labeling requirements. The packaging and labeling requirements address the shock hazards which can be caused by direct contact with exposed live electrical

conductors or by contact with an intervening conductive object. The requirements also address the fire hazards which can be caused by excessive heating of flammable materials.

After reviewing the NCL Review Panel recommendations, the Commission concluded that guidelines are necessary to ensure that the placement, type size, and prominence of the requisite labeling statements would make them conspicuous to the consumer. Because of the similarities between the labeling presently required for hazardous substances under the Federal Hazardous Substances Act (FHSA) and that required by this proposal, the proposed standard, at § 1208.10, provides that 16 CFR 1500.121, governing the prominence and conspicuousness of FHSA labeling, may be used as guidance for the labeling required by this section.

The proposal would require that miniature Christmas tree lights have a label containing cautionary information permanently affixed to the light string and located between the plug and the first lampholder. A permanent label is necessary since the fire and shock hazards addressed by the labeling could occur throughout the life of the product. The location of the label (between the plug and the first lampholder) is necessary since the consumer is likely to handle the product at this point when the product is used, and thus is likely to read the label if it is placed in this location.

The proposal would require that the permanently affixed label and the package have the signal word "Caution" or "Warning" as well as the statement of hazard "to avoid fire or shock hazards". The signal word is necessary to draw attention to the cautionary information on the label. The statement of hazard is necessary to state the purpose of the cautionary information.

The proposal would also require the following cautionary information: "Do not use on trees with metal or metallic needles, leaves or branch covering."

"Do not use staples or sharp-edge fasteners which can damage insulation."

"Use only decorations over lamps if provided with light set."

Metallic trees pose a potential shock hazard or fire hazard resulting from shorting if metal needles or other such conductive parts of trees penetrate the insulation of the light string as it is being installed on the tree, or work their way into bulb sockets or other openings in the string's insulation so as to contact live conductor parts.

Similarly, staples or sharp-edged fasteners may expose the user to electric shock or fire resulting from shorting if the fasteners contact live parts of the light string by penetration of the insulation as they are installed.

Attaching decorations to the bulbs, unless they are specifically designed to eliminate any potential hazard when employed with a particular pattern of light string, can pose a potential shock hazard when metallic parts of the decoration are pushed down into the bulb socket or are pushed through the insulation so as to contact live parts of the string. In addition, potential fire hazards occur if combustible or nonfire retardant materials present in the decoration are overheated by the bulb, and if the decoration overheats the lampholder.

The proposal would also require the permanently affixed label and the package to contain the complete name and mailing address of the domestic manufacturer, domestic importer, distributor, or private brand seller and the manufacturer's identification number (which may be in code), indicating the style number or name, the lot number, and the year of manufacture. This information is necessary in order to allow the Commission and consumers to identify the manufacturer and the product.

The proposal would require lamp and fuse replacement information on the permanent string label and package. The proposal would also require voltage and manufacturer information on the packet of spare bulbs if provided. Replacement information is necessary since installation of bulbs intended for use in light strings with a greater or smaller number of series bulbs than the string in which the bulb burn out has occurred will result in overheating, thus increasing the liklihood of fire hazard. Therefore, bulb replacement information for the string is required on the permanent string label. Since present day technology does not provide an economical, acceptable means to mark the voltage rating directly on the miniature light bulbs, voltage-rating information is required on the container of spare replacement bulbs to try to forestall installation of these bulbs in an inappropriate string, thus increasing the possibility of fire. In addition to the voltage rating of the bulbs, the spare-bulb container carries a manufacturer-identification to provide traceability of the manufacturer in case of safety or other problems with the bulbs.

Fuse replacement information is required for replaceable fuses since this information is necessary to ensure the continued effectiveness of this overcurrent protective device.

The offeror recommended that the Commission require the inclusion of the Commission's Hot Line number (a toll free number established to receive consumer complaints about product hazards and disseminate information about product safety) on the permanently attached label. The Commission has not included this provision in the proposed standard since inclusion of the number could lead to many calls unrelated to safety, such as calls concerning broken or burned out bulbs. This practice could also overburden the Commission's small hotline staff.

The Commission believes that the labeling included in this section also constitues performance and technical data authorized by Section 27(e) of the Consumer Product Safety Act (15 U.S.C. 2076(e)). Consequently, the Commission is also relying on this section as authority for these requirements.

The Commission is publishing with the proposed standard at § 1208.53 of Subpart C labeling recommendations concerning care and use instructions. While the labeling provisions of this section are not requirements of the standard, the Commission encourages manufacturers to follow these recommendations.

TESTS

The proposed standard, at Subpart B, includes tests applicable to miniature Christmas tree lights. These tests have been included in order to allow the Commission to test for compliance purposes. A brief summary of these tests is provided below. Failure to meet the performance requirements can generally result in exposure of live parts and short circuit conditions, or other conditions which are further explained below in connection with each test.

WIRE INSULATION RESISTANCE (1208.13)

The purpose of this test is to ensure that the material covering the wire conductor will provide adequate insulation. The test is widely applied to appliance wiring insulating materials.

WIRE INSULATION ELONGATION AND TENSILE STRENGTH (1208.14)

The purpose of this test is to evaluate the characteristics of the wire insulation by performing comparative strength tests before and after accelerated aging of specimens. This test has been widely applied to thermoplastic insulation which has polyvinyl chloride as the basic constituent.

HEAT-SHOCK TEST FOR WIRE INSULATION (1208.15)

The purpose of this test is to evaluate the behavior of wire insulation in terms of whether it will crack should it come in contact with hot surfaces up to 121° C for up to one hour.

DEFORMATION TEST (1208.16)

The purpose of this test is to evaluate the flow characteristics of wire insulation under mechanical pressure when it undergoes a rise in temperature.

COLD-BEND TEST (1208.17)

The purpose of this test is to evaluate the bendability of the wire insulation without cracking while being subjected to the coldest outdoor conditions likely to be encountered.

WEATHERING TEST (1208.18)

The purpose of this test is to evaluate the wire insulation for strength and aging after exposure to simulated rain and sun (ultra-violet light) conditions.

The proposed standard includes a weathering test for wire insulation in which specimens of wire are exposed in a xenon arc Weather-Ometer for a period of 1248 hours. Use of the xenon arc Weather-Ometer as opposed to other Weather-Ometers is proposed because the spectrum of radiation achievable with a xenon arc device more closely approximates the spectrum of solar radiation than do the spectra of other Weather-Ometers. Therefore, the xenon arc device has the potential for providing a fairer, more universal and more representative test than do the other available devices.

DIELECTRIC TEST FOR WIRE INSULATION (1208.19)

The purpose of this test is to locate any defects in the completeness of the insulation by placing a high voltage between the outer surface of the wire insulation and the wire conductor.

ABRASION TEST FOR WIRE INSULATION (1208.20)

The purpose of this test is to evaluate the wear characteristics of the wire insulation.

FLAMMABILITY TEST FOR WIRE INSULATION (1208.21)

The purpose of this test is to evaluate the horizontal burning rate of the finished insulation. The test requires that slow burning wire be used.

FLEXING TEST FOR WIRE (1208.22)

The purpose of this test is to evaluate the mechanical flexing characteristics of the wire. The test requires that the stranding of the conductors resist breakage as a result of flexing which is likely to be encountered while in service.

STRAIN RELIEF TEST FOR LAMPHOLDERS, FUSEHOLDER AND COMPONENT BODIES OTHER THAN PLUGS AND CONNECTORS (1208.23)

The purpose of this test is to evaluate the secureness of the attachment of wires to the component bodies of a string (other than the plugs and connectors). The test includes wire-to-wire pulls and wire-to-component pulls.

SECURENESS OF LAMPHOLDER CONTACTS (1208.24)

The purpose of this test is to evaluate the secureness of the lampholder electrical contacts to resist mechanical forces which tend to lift them out from the lampholder upon removal of a lamp or upon pushing the wires where the wires enter the lampholder.

DIELECTRIC TEST FOR LAMPHOLDER AND LAMP ASSEMBLY (1208.25)

The purpose of this test is to evaluate the separation of lampholder and lamp contacts by applying a 1250 volt potential across the contacts. If not adquately separated, bulbs could short out and result in overheating other components.

CRUSH TEST FOR LAMPHOLDERS AND FUSEHOLDERS (1208.26)

The purpose of this test is to evaluate the strength of the component bodies to resist breakage which could expose live parts or short circuit. The 16 pound force value represents a maximum thumb and forefinger pressure of the 95th percentile adult male as defined by Dreyfus in "The Measure of Man".

FLAMMABILITY TEST FOR CLASS Z APPLICATIONS (EXCEPT WIRE) (1208.27)

This test evaluates the flame retardant characteristics of materials and is based on that contained in Underwriters Laboratories Standard UL 94 for 94 VO rated materials.

SHORT CIRCUIT SIMULATION TEST (1208.28)

The purpose of this test is to evaluate the overcurrent protective device in terms of its ability to interrupt circuits having the short curcuit current capacity likely to be encountered in the field without causing hazardous situations such as ignition of materials in proximity to the device. The test also determines whether the protective device will operate to prevent a lamp(s) from rupturing and igniting combustible surroundings when a short in the wiring occurs with one or more lamps in the shorted circuit.

CASCADE FAILURE SIMULATION TEST (1208.29)

The purpose of this test is to simulate the overcurrent conditions which could occur during the normal and failure operating modes of the miniature light string or decorations when lamp filaments burn out and the circuit current increases due to operation of the shunt feature contained within the lamps. With the Commission modification, the test is also intended to uncover hazardous situtations resulting from the accidental contact between a lamp and another lampholder, and from the bunching of the lamps together for unique decorative effect. The test is intended to uncover conditions where bare conductors or ignition hazards might result from lampholder melt down.

TEMPERATURE TEST FOR PLUGS, CONNECTORS, AND FUSEHOLDERS (1208.30)

Under maximum current conditions, the conductors of plugs, connectors and fuseholders should not result in temperature rises that indicate relatively high resistance paths. The purpose of this test is to evalute the adequacy of the conductors in terms of size, conductivity, and contact resistance. The test also evaluates connectors in terms of the adequacy of the receptacle contacts to resist burning or pitting.

RECEPTACLE INSERTION-WITHDRAWAL TESTS (1208.31)

The purpose of this test is to evaluate the characteristics of receptacles for retaining the blades of attachment plugs and add-on connectors.

PLUG AND CONNECTOR BLADE PULL TEST (1208.32)

The purpose of this test is to evaluate the security of the blades within the body of the plug or connector to resist pull forces. If a blade is displaced or dislodged it could expose live parts to contact by persns.

PLUG AND CONNECTOR BLADE PUSH TEST (1208.33)

The purpose of this test is to evaluate the integrity of the blades within the body of the plug or connector to resist push forces. A test failure occures if a blade is displaced or the enclosure opened to expose live parts.

CRUSH TEST FOR PLUGS AND CONNECTORS (1208.34)

This test evaluates the ability of the plug and connector bodies to resist breakage which could expose live parts or short circuit. The 75 pound force represents the crushing force under foot and is derived from a crush test in Underwriters Laboratories Standard UL 498.

STRAIN RELIEF TEST FOR PLUGS AND CONNECTOR CONNECTIONS (1208.35)

The purpose of this test is to evaluate the attachment of the wires to the plugs and connectors to resist pull forces that could expose live parts.

SECURITY OF INSULATION AT PLUGS AND CONNECTORS TEST (1208.36)

The purpose of this test is to evaluate whether insulation can slip away from the conductors of wire when pulled. If this condition exists, live parts could be exposed.

DECORATIVE PART DOWNWARD BURNING RATE TEST (1208.37)

The purpose of this test is to evaluate whether materials are relatively slow burning. All materials used on miniature Christmas tree lights and decorations should, as an absolute minimum, meet the burning rate requirements of this test. The test does not rule out most paper, flock, fiber, plastic and other materials unless they are very flammable.

HEATING TEST FOR LAMPS AND LAMPHOLDERS (1208.38)

The purpose of this test is to simulate additional credible failure modes that cannot be determined by using the Cascade Failure Simulation Test. The temperature of 248° F (120° C) is the minimum for lamp bases and lampholders to withstand.The heat can be generated under conditions including: (a) Placing over the lamp assembly a decorative attachment not supplied with the lighting unit, (b) defective lamps that run abnormally hot, and (c) incorrect replacement of lamps into the light string by consumers that result in high-heat conditions. The two hour period allows for a full thermal soaking so that the ultimate effects on materials will become apparent.

MILLIVOLTS DROP TEST FOR LAMPHOLDERS (1208.39)

The purpose of this test is to evaluate the electrical integrity of the wire-to-lampholder connections to ensure that relatively low-resistance connections are used which will not add excessive heat to the lamp/lampholder assembly.

MAXIMUM WATTAGE TEST FOR LAMPS (1208.40)

The purpose of this test is to eliminate lamp bulbs that could generate extremely high surface temperatures (approaching the self-ignition temperature of materials used in and around Christmas tree lights). While this test is not expected to affect most presently known bulb designs, it is an important limitation to prevent future designs which could present a hazard when used as replacement bulbs in miniature Christmas tree lights.

CONDUCTIVE TINSEL TEST (1208.41)

The purpose of this test is to protect consumers against electric shock when they contact metallized tinsel and other conductive strips and threads near string components.

C. RECOMMENDATIONS (SUBPART C)

The Commission is publishing with the proposed standard several recommendations concerning miniature Christmas tree lights. Although these recommendations at Subpart C are not part of the proposed standard and would not, if published by the Commission with any final standard, be binding, the Commission believes that these recommendations are in the public interest and could improve the safety of the product. The Commission encourages manufacturers to follow these recommendations in making miniature Christmas tree lights.

At § 1208.50 the Commission recommends that materials be used which are appropriate to the functions of the parts they comprise. Although this provision is of a generalized nature, it has been included as a recommendation in order to further emphasize to manufacturers the importance of using the proper materials for miniature Christmas tree lights.

At § 1208.51, the proposal includes general recommendations to protect against corrosion of parts of the lights that enclose, or support or secure enclosures of electrically energized parts. The section recommends that parts be of stainless steel, or plated or coated iron or steel. Corrosion or rust of these parts could lead to failure of the part, resulting in exposure of live metal parts.

At § 1208.52 the proposal includes recommendations that address the mouthburn and other electrical shock hazards that plugs and connectors present to children. These recommendations are based on the provisions in the Underwriters Laboratories (UL) Standard for Cord Sets and Power Supply Cords (UL 817 A). The extension cord provisions have been included as recommendations for minature Christmas tree lights since the potential hazards from fire and shock with extension cords are also present in miniature Christmas tree lights. The Commission believes that plugs and receptacles on minature Christmas tree lights may be at least as inviting to small children as they are on extension cords. The CPSC has decided that a mandatory standard is not necessary at this time to address the mouthburn and shock hazards associated with extension and power supply cords since the provisions of the UL Standard (UL 817 A) appear to be adequate. The Commission believes that the recommendations at Section 1208.52, which are similar to provisions in the existing voluntary standard (UL 817 A) would, if followed, adequately address the mouthburn and shock hazards associated with miniature Christmas tree lights. The Commission does not at this time believe that it is necessary to include these provisions as requirements. However, if the Commission receives information idicating that mouthburns and electric shocks to childern are occurring in spite of these recommendations because of a failure to follow them, the Commission would consider amending the standard to include these provisions as requirements.

The recommendation for faces of attachment plugs and add-on connectors at § 1208.52(a) is intended to provide greater distances between the blades and the surfaces likely to be contacted by the small fingers of children. At § 1208.52(b) the Commission recommends that plug bodies provice a finger grip of finger gripping area to reduce the likelihood that a plug can be gripped at the periphery of the face where the blades project. If plugs are gripped at this point, contact with the live blades may result. The Commission also recommends that wires not project from the plug or add-on connector in the finger grip, so that wires are not damaged when the plug is gripped.

At § 1208.52(c) the proposal recommends that live parts within receptacle openings be recessed at least ¼ inch (6.35mm) from the receptacle face. This distance would ensure a separation to prevent bridging by saliva, where children place the receptacle in their mouth.

At § 1208.52(d) the proposal recommends that all receptacle openings be reliably and effectively closed with insulating material. The purpose of this recommendation is to provide additional precautions against contact and bridging by saliva of children with live parts within receptacle openings. This recommendation is generally consistent with provisions in the UL Standard for extension cord sets. This recommendation differs from the UL provision since it includes all receptacle openings, whereas the UL extension cord set standard permits one receptacle to remain open. This difference is based on the fact that extension cord sets are generally only energized when at least one receptacle is used, so that one receptacle could remain with a closure. By contrast, Christmas tree lights are often operated when no receptacles are used, so that all receptacles should be closed.

The Commission is publishing with the proposed standard labeling recommendations at § 1208.53 of Subpart C. These labeling recommendations involve care and use instructions, including instructions for testing and inspecting the light strings before use, instructions for the proper replacement of blubs and fused. instructions for proper storage, special precautions for outdoor use, a cautionary message to keep young children away from light strings and bulbs, and (if the light string has a separate and connector receptacle) a statement indicating that only other miniature lights or decorations with miniature lights should be attached to the receptacle.

The Commission encourages interested persons to comment on the rec-

ommendations that have been included at Subpart C of this proposal.

D. OTHER CONSIDERATIONS

Findings. Section 9(c) of the act requires that prior to promulgating a consumer product safety rule the Commission shall consider and make appropriate findings as to:

(1) The degree and nature of the risk of injury which the rule is designed to eliminate or reduce;

(2) The approximate number of consumer products, or types or classes thereof, subject to such rule;

(3) The need of the public for the consumer products subject to such rule, and the probable effect of such rule upon the utility, cost, or availability of such products to meet such need;

(4) Any means of achieving the effect of the rule while minimizing adverse effects on competition or disruption or dislocation of manufacturing and other commercial practices consistent with the public health and safety;

(5) That the rule (including its effective date) is reasonably necessary to eliminate or reduce an unreasonable risk of injury associated with miniature Christmas tree lights and similar miniature decorative lights; and

(6) That promulgation of the rule is in the public interest (15 U.S.C. 2058 (b) and (c)).

The Commission must also include these findings in the final rule.

Section 9(b) of the act (15 U.S.C. 2058(b)) requires that in promulgating a consumer product safety rule, the Commission shall also consider and take into account the special needs of elderly and handicapped persons to determine the extent to which such persons may be adversely affected by the rule.

The Commission welcomes comments from interested parties relating to all aspects of the subject matter of these findings.

THE DEGREE AND NATURE OF THE RISK OF INJURY THE RULE IS DESIGNED TO ELIMINATE OR REDUCE

The proposed standard is intended to reduce electrical fire and shock hazards associated with miniature Christmas tree lights. Based on the CPSC 1975 Christmas Decorative Light Survey, the Commission's technical analyses of hazards associated with miniature Christmas tree lights (Engineering Analysis of Miniature Christmas Tree Lights—December 20, 1976), and also on information about injuries associated with this product, the Commission has determined that potentially fatal fire and electrical shock hazards may result from using these products. The Commission has preliminarily determined that miniature Christmas tree lights present an unreasonable risk of injury. Technical analysis of hazards associated with miniature Christmas tree lights by the Commission staff indicates that shock hazards can be caused by direct contact with exposed live electrical conductors or by contact with an intervening conductive objective (such as a metallic tree ornament or accessory) that is in contact with the exposed conductor. The following are examples of characteristics of these lights which can create shock hazards: Bare wire where the wire enters the lampholders or plugs; plug and receptacle fittings that readily come apart; exposed lamp leads; cracked lampholders; and lampholders contacts which come out when the bulb is removed, thereby exposing the live contacts. Fire hazards can result from certain characteristics of light strings that may allow an exposed conductor to short to a grounded object, causing arching or excessive heating of flammable materials. The conductor can be exposed from bare wire at the entrance to lampholders of plugs, exposed lamp leads, cracked lampholders, or lampholders contacts that come out when the bulb is removed. Fire hazards can result from easily flammable grades of thermoplastic material heated by excessive current flow or arching. In addition, fire hazards can also result from the use of wire without proper overcurrent protection.

Approximately 20 percent of the incidents associated with miniature Christmas tree lights reported during the 1977 Christmas season involved fire; 70 per cent involved smoking, overheating or melting without evidence of actual ignition; and 10 percent involved reports of exposed current-carrying wires.

From 1974–1976, a total of 183 incidents involving Christmas tree lights were reported to the Commission from all sources, including in-depth investigations, consumer complaints received by the Commission and newspaper clippings provided by various clipping services available to the Commission. In about 40 percent of these incidents miniature Christmas tree lights were identified as the product. In about 20 percent of the incidents, larger size light strings were identified as the product. In the other 40 percent of the incidents, the product was identified only as "Christmas tree lights." Fifty of the incidents resulted in personal injury. The primary hazard was fire: More than two thirds of the injuries were burns, either from direct contact with a burning light string or as a result of an extensive fire. Twelve of the 50 injuries were definitely attributed to miniature Christmas tree lights. Eleven of the injuries were definitely attributed to larger size strings. The remaining 27 injuries could not be attributed to a light string of a definite size. In many cases where there was extensive fire damage, the kind of light string involved could not be identified.

The Commission has received several newspaper clippings reporting fires known or suspected to involve Christmas lights that occurred during the 1977 Christmas season. Most of these fires involved extensive property damage.

Economic analysis. The Commission has considered the potential economic effects of this proposed standard on the industry and on consumers, including possible changes in the production cost and retail price of some lighting units and effects on the utility and availability of miniature Christmas tree lights. The National Consumers League submitted with its recommended standard an economic analysis report which provides a substantial amount of information about the potential impact of this proposed standard, which is similar in most respects to NCL's recommended standard. The Commission believes that the conclusions of the report are generally applicable to this proposal. Their analysis estimates that some 30 to 40 million miniature Christmas tree lights and similar miniature decorative lights produced each year are potentially subject to a standard, and that the provisions of the submitted standard would probably lead to an increase in the average total cost of manufacturing miniature Christmas lights of approximately 8 to 12 percent. This may result in an increase in the retail price of some sets. It is expected that necessary changes to lights can be made within the limits of existing manufacturing practices and technology. The cost increase may be smaller for products now conforming to the Underwriters Laboratories' voluntary provisions, since the proposal includes many requirements that are similar to the UL provisions. Since the majority of Christmas tree lights are produced in Taiwan and since the Taiwan government has decided to require that all Christmas lights exported to the United States be UL listed after July 31, 1978, the economic effect of the standard may be minimized.

Changes and additions to the NCL recommended standard made by the Commission may add further to the estimated increases in production costs and retail prices and may affect the availability of certain kinds of products. The addition of the heating test for lamps and lampholders (1208.38), for example, may result in the discontinuation of the use of low-density polyethylene as a lampholder material. Some models of strings, particularly those with certain 12 volt lamps, may no longer be available as a result of changes made to the Cascade Failure Simulation Test (1208.29). Certain models of lamps such as ballast lamps

or twinkle lamp designs may no longer be available as a result of the maximum wattage test for lampholders (1208.40).

An economic analysis report on the proposal will be made available for interested persons to comment on before the Commission decides whether to issue a final standard. This report will also treat the economic issues associated with product testing and any certification rule the Commission may propose.

The Commission has considered available information concerning the degree and nature of the risk of injury summarized above from the CPSC 1975 Christmas Decorative Light Survey, the Commission's technical analyses of hazards associated with miniature Christmas tree lights, and information about injuries associated with this product. The Commission has also considered presently available information concerning the potential economic effect of this proposed standard on industry and on consumers. The Commission will make available for public comment any additional economic information and analysis that is relevant and relied upon in the final standard. At the present time the Commission believes that the potential benefits associated with the proposed standard appear to outweigh the effect of the proposed rule on the cost, utility, and availability of the product. The Commission preliminarily determines that miniature Christmas tree lights and similar miniature decorative lights present an unreasonable risk of injury from electric shock and fire.

E. Stockpiling

The Commission has not included an antistockpiling provision in the proposed standard since, as a result of the nature of the miniature Christmas tree light industry, the Commission does not believe that such a provision is necessary to prevent the intentional buildup of noncomplying inventories. For most firms, a substantial and costly deviation from normal production, and distribution practices and shipping schedules would have to be made in order to have non-complying merchandise in the U.S. before the effective date. The Commission believes that most firms will not have sufficient economic incentive to make these changes. If the Commission later determines that an antistockpiling provision is necessary, the Commission will issue such a rule.

F. Environmental Considerations

The Commission has conducted an environmental assessment of the regulatory alternatives concerning miniature Christmas tree lights, addressing the potential effects of action on the production, distribution, consumption, and disposal of products subject to the standard. The effects of these alternatives will not lead to any significant impact on air and water quality, solid waste disposal, land use, energy use, or any other aspect of the physical environment. Since the proposed standard would not have a significant adverse effect on the quality of the human environment, an Environmental Impact Statement is not required. A copy of the environmental assessment may be seen in, or obtained from, the Office of the Secretary.

G. Effective Date

The Commission is proposing that the standard become effective on December 1, 1979. Miniature Christmas tree lights that are manufactured after the effective date of this standard must meet its requirements if the product is manufactured for sale, offered for sale, or distributed in commerce within the United States or if the product is imported into the United States.

The Commission is interested in implementing the standard in the shortest period of time consistent with the need to protect the public that will not create major market disruptions. Since many of the provisions in the proposed standard are currently being met by manufacturers, the Commission believes that the proposed effective date is consistent with the need to protect the public. In proposing this effective date, the Commission has taken into consideration the nature of the overseas production cycle for this product, since most of the light strings are manufactured abroad. Information presently available to the Commission indicates that the foreign manufacturing cycle, including raw material or component part acquisition, begins as early as fifteen to eighteen months before a given Christmas for some firms.

Assembly of the product for many firms may continue until seven or eight months before Christmas. The Commission believes that the December 1, 1979 effective date is reasonable and necessary to allow all manufacturers to comply with the standard with a minimum amount of disruption to their production cycles and manufacturing practices; products to be sold in the 1979 Christmas season would have been imported by the December 1, 1979 effective date. In addition, the Commission believes that the effective date is reasonable since presently available information indicates that most manufacturers would be able to make any necessary changes in their production process within the period between the anticipated publication of the final standard (March 15, 1979) and the proposed effective date, December 1, 1979. Also, since the foreign manufacturing cycle for the 1980 season would not begin before June 1979 for most firms, the anticipated publication of the final standard should provide most manufacturers with sufficient time to acquire raw materials and component parts for the 1980 Christmas season. If additional data show that it is in the public interest to extend or shorten the proposed effective date, the effective date could be changed. The Commission encourages the submission of data and arguments concerning the most appropriate effective date.

H. Certification and Labeling

Manufacturers and private labelers of miniature Christmas tree lights will be required to comply with the certification provisions of section 14(a)(1) of the act (15 U.S.C. 2063(a)(1) after the effective date of the miniature Christmas tree light safety standard. Section 14(a)(1) requires manufacturers (and private labelers, if the product bears a private label) to issue a certificate which states that the product conforms to all applicable consumer product safety standard and specifies any applicable standard. The certificate shall be based on a test of each product or upon a reasonable testing program and must state the name of the manufacturer or private label issuing the certificate and include the date and place of manufacture. Section 14(b) provides that, at the option of the person required to certify the product, testing may be conducted by an independent third party qualified to perform such tests or testing programs.

In addition, section 14 (b) and (c) of the act allows, but does not required, the Commission to issue regulations which would (1) prescribe a reasonable testing program, (2) specify which manufacturer shall issue the certificate when a product has more than one "manufacturer," and (3) require labeling of products subject to the safety standards. (Manufacturers of products subject a consumer product safety standard are required to issue a certificate under section 14(a)(1) based on a test of each product or on a reasonable testing program, even if the Commission has not issued regulation section 14 (b) and (c). Specific certification and labeling requirements of the type authorized by section 14 (b) and (c) of the Consumer Product Safety Act are not included in the proposed standard, but the Commission anticipates that they will be developed in the near future. The rule on certification and labeling will be separately proposed for public comment in accordance, with the requirements of the Administrative Procedure Act (5 U.S.C. 553). However, the Commission anticipates at this time that the proposed standard will not be issued in final form until the certification rule is also issued.

Until such time as the Commission proposes a rule on certification, the following is offered as an indication of how the Commission staff believes that the Commission's certification rule should be structured. Interested persons may wish to use this as guidance for the development and conduct of a reasonable testing program and as guidance in commenting on the provisions of the standard itself.

The proposed standard includes many requirements and tests for components at subpart B. The Commission recognizes the impracticability of testing each item of an assembled product against each requirement of the standard. Therefore, the Commission offers the following guidance. The Commission believes that using certain known available materials of given specifications might provide a high degree of assurance that many of the components will meet the general requirements of the standard and will pass the performance tests in subpart B. Examples of such components are wire, fuses, plugs, and connectors. The following performance tests at subpart B of the standard address wire components: 1208.13-22. Plugs and connectors are covered by the following tests: 1208.30-36. Consequently, a manufacturer of a miniature Christmas tree light string should be able to be assured that the light string will meet many of the requirements of the standard, including many of the performance tests in subpart B of the standard, if appropriate component materials are purchased. The Commission believes that certification for miniature Christmas tree lights could in part be based on certification of components by component suppliers. The component supplier would certify the components as meeting the applicable requirements of the standard after an inspection or test of each component or by performance of a reasonable testing program.

The person issuing the certificate of performance for the assembled strings would rely on testing and inspection records from the component supplier as one of the basis for certification that the assembled string meets those requirements of the standard applicable to the certified components.

For some requirements of the standard manufacturers may not have any reasonable assurance that the requirements can be met by design or material choice. Instead, the ability to meet these requirements depends on the quality of workmanship or assembly practices. For these requirements the Commission believes that it will be necessary for the manufacturer to actually test the completed product. This may be necessary in order to ensure compliance with the requirements of the standard applicable to lampholders. As a result of the impracticability of testing each product, conformance to the standard may be demonstrated by the use of a lot acceptance sampling plan, where a lot to be inspected or tested is a quantity of production items manufactured during some specified time interval. The quantity of production in the lot or the interval of time of production used to define the lot is left as a choice of the manufacturer, or of the party responsible for issuing the certificate. For example, the manufacturer might choose to inspect or test each day's production of a given model, or each week's; or each month's. As guidance to the manufacturer, if experience has demonstrated that the production items are not highly variable so that requirements can be met with ease, then defining a lot in terms of a large quantity of production is justified and will minimize testing costs. If the production items are variable and, at times may not conform to the requirements, then smaller lot sizes are desirable. By identifying products by lot, on the box, manufacturers may be able to ensure that the Commission will not be forced to take action against a larger quantity of product to protect the consumer against a hazard associated with a particular lot.

The Commission staff is now drafting a proposed certification rule including a reasonable testing program. Although several months may be required before this certification rule could be published as a proposal, the Commission recognizes that the content of the Commission's certification rule and the final form of the standard are interrelated. The Commission does not intend to issue a final standard before the certification rule is issued, so that the effects of the certification rule and the standard on each other can be considered.

Although the Commission does not intend to issue a certification regulation as part of the standard that is being proposed in this notice, the Commission believes that it would be helpful to solicit comments on issues related to this subject so that these comments can be considered in drafting a proposed certification regulation. The following questions are among those that will be considered in the process of issuing a certification regulation.

1. Who should be required to certify? To what extent should component manufacturers be required to certify their components? To what extent should manufacturers be allowed to rely upon the certification of component manufacturers?

2. Concerning the requirement for a "reasonable" testing program:

(a) Should the Commission specify a reasonable testing program? Should compliance with the program be mandatory on those who are required to issue certificates of compliance? Or should the program be issued as a guideline?

(b) If the Commission does issue a document on reasonable testing, would it be sufficient to specify the levels of quality to be maintained and verified by a reasonable testing program? Or,

(c) Should the Commission prescribe the specific steps required for sampling and testing?

3. What would be the most appropriate and effective testing programs? Is design qualification testing sufficient to demonstrate compliance to the standard? Should production testing by means of inspection and testing of samples from production be a part of a reasonable testing program?

4. Should manufacturers be required to retain the samples that are tested? If so, for how long?

5. What records should be kept of the manufacturer's testing programs, the tests performed, and the test results? How long should such records be maintained?

6. What are the expected cost or other economic effects of practices or procedures manufacturers are likely to demonstrate compliance to testing and certification requirements?

In addressing these questions, commentors should keep in mind the nature of the miniature Chirstmas tree light industry and the cost and effects of any contemplated testing program.

Comments that solely concern certification issues will not be addressed in the preamble to any final consumer product safety standard for miniature Christmas tree lights that may be issued by the Commission. Rather, these comments will be considered by the Commission prior to proposing a certification regulation. The substantive comments that are received on that proposal will be addressed in the preamble to the final certification regulation when it is issued.

I. Extension of Time To Publish Final Rule

Section 9(a)(2) of the CPSA (15 U.S.C. 2058(a)(2)) requires the Commission to publish a notice of proposed rulemaking in the Federal Register and to provide interested persons with an opportunity to participate in the rulemaking through submission of written data, views, or agruments. In addition to these written comments, interested persons must also be given an opportunity for the oral presentation of data, views, or arguments.

Section 9(a)(1) of the CPSA provides that within 60 days after publication of a proposed rule, the Commission shall promulgate a final rule or withdraw the proposal. The Commission may extend the 60-day period for good cause and must publish its reasons for extension in the Federal Register.

The process of issuing a consumer product safety rule or withdrawing the applicable notice of proceeding requires the Commission to consider the substantive comments that are received on the proposal, decide if any changes to the proposed rule are required, make the findings required by section 9 of the act, and prepare an appropriate FEDERAL REGISTER notice. In the case of the proposed standard for miniature Christmas tree lights the Commission intends to issue a certification rule under section 14(b) of the act along with a final standard. The certification rule must also be proposed for public comment, and the public comments must be considered, before the certification rule can be issued in final form. As a result of these factors the Commission does not believe that a final standard can be issued until March 15, 1979. Accordingly, the Commission hereby extends until March 15, 1979, the date on which it must either publish a consumer product safety rule addressing the risk of injury from fire and shock associated with minature Christmas tree lights or withdraw by rule the applicable notice of proceeding. This period may be further extended for good cause shown.

CONCLUSION AND PROPOSAL

Having considered NCL's recommended safety standard for miniature Christmas tree lights and the supporting material submitted therewith, together with other relevant information, the Commission concludes that the recommended standard, changed as described above should be proposed as a consumer product safety standard.

Accordingly, pursuant to provisions of the Consumer Product Safety Act (7(f), 27(e), Pub. L. 92-573, 86 Stat. 1215, 1227, 15 U.S.C. 2056(f), 2076(e)), the Commission proposes that title 16, chapter II of the Code of Federal Regulations be amended by adding to subchapter B a new part 1208, as follows:

PART 1208—STANDARD FOR MINIATURE CHRISTMAS TREE LIGHTS AND SIMILAR MINIATURE DECORATIVE LIGHTS

Subpart A—General Requirements of the Standard

Sec.

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1208.13 Wire insulation resistance test.
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1208.21 Flammability test for wire insulation.
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1208.23 Strain relief test for lampholders, fuseholders, and other bodies except plugs and connectors.
1208.24 Secureness of lampholder contacts test.
1208.25 Dielectric test for lampholder and lamp assembly.
1208.26 Crush test for lampholders and fuseholders (other than types which are incorporated in plugs and connectors).
1208.27 Flammability tests for class Z applications (except wire).
1208.28 Short circuit simulation test.
1208.29 Cascade failure simulation test.
1208.30 Temperature test for plugs, connectors, and fuseholders.
1208.31 Receptacle insertion-withdrawal tests.
1208.32 Plug and connector blade pull test.
1208.33 Plug and connector blade push test.
1208.34 Crush test for plugs and connectors.
1208.35 Strain relief test for plug and connector connections.
1208.36 Security of insulation test at plugs and connectors.
1208.37 Decorative part downward burning rate test.
1208.38 Heating test for lamps and lampholders.
1208.39 Millivolts drop test for lampholders.
1208.40 Maximum wattage test for lamps.
1208.41 Conductive tensel test.

Subpart C—Recommendations

1208.50 General materials.
1208.51 Conductive materials.
1208.52 Plugs and connectors.
1208.53 Recommended labeling.

AUTHORITY: Sec. 2, 3, 7, 9, 14, 19, 27(e), Pub. L. 92-573, 86 Stat. 1207, 1208, 1212-17, 1220, 1224, 1227 (15 U.S.C. 2051, 2052, 2056, 2058, 2063, 2068, 2076(e).)

Subpart A—General Requirements of the Standard

§ 1208.1 Purpose, scope, and application

(a) *Purpose.* The purpose of this subpart A and subpart B, which together comprise the safety standard for miniature Christmas tree lights and other similar miniature decorative lights, is to set forth requirements to address the hazards of electric shock and fire, which are associated with the use of miniature Christmas tree lights and similar miniature decorative lights, and which may cause injury or death.

(b) *Scope and application.* (1) This part 1208 applies to all miniature Christmas tree lights as defined in § 1208.3(i) that are produced or distributed for sale to or for the personal use, consumption, or enjoyment of consumers in or around a permanent or temporary household or residence, a school, in recreation or otherwise. This part does not apply to miniature Christmas tree lights that are not customarily produced or distributed for sale to, use or consumption by, or enjoyment of a consumer.

(2) Miniature Christmas tree lights manufactured after the effective date of this standard must meet the requirements of this standard if the miniature Christmas tree light is manufactured for sale, offered for sale, or distributed in commerce within the United States of if the miniature Christree tree light is imported into the United States.

(3) For enforcement purposes the requirements of this part 1208 are based on the U.S. customary units for measurement, that are given in the part. However, for convenience, the metric (SI) equivalents are also given.

§ 1208.2 Effective date.

This part 1208 becomes effective as to products manufactured after December 1, 1979.

§ 1208.3 Definitions.

For purposes of this part:

(a) "Add-On connector" means a combination attachment plug and receptacle device that may be attached to the electrical conductors of an appliance (including a miniature Christmas tree light), designed to accept the electrical attachment plug(s) of other appliances (including a miniature Christmas tree light), without adding additional current to the wires of the appliance of which it is a part. An add-on connector is also known as a "current tap".

(b) "Attachment plug" means a device attached to electrical conductors of an appliance (including a miniature Christmas tree light), which, by insertion into a receptacle, establishes electrical connection between the appliance and the receptacle conductors. See also the definition of add-on connector.

(c) "Connector" means a receptacle device that may be a part of an appliance (including a miniature Christmas tree light) and is used for the connection of an attachment plug. It may be integral with the plug, in which case it is an add-on connector; or it may be a pendant on the wires, in which case it is an end connector.

(d) "Decorative part" means any attachment to a string that is not a part relied upon for enclosing or supporting electrically live parts.

(e) "End connector" means a receptacle device that is a pendant on the wires and may be used on an appliance including a miniature Christmas tree light) for the connection of an attachment plug. Also known as a "cord connector body."

(f) "Lamp base" means the part of an electric light bulb that supports the bulb envelope and separates the elec-

trical contacts that mate with a lampholder. The lamp base may or may not be a permanent part of the bulb envelope.

(g) "Lampholder" means a socket for the insertion of an electric light bulb. A lampholder is attached to the wires of a string.

(h) "Lay" means the distance between the points in which the wire or wire conductor strands complete one cycle of twist.

(i) "Miniature Christmas tree light or similar miniature decorative light" means a lighting unit intended for use with Christmas trees or other decorative applications, which: (1) has lamps or lampholders electrically connected by wires in series or in combinations of series paths, (2) is equipped with or intended to be used with lamps that dissipate 4 watts of power or less per lamp when the product is connected to a 120 volt rms source, and (3) is intended to be supplied electric power from a nominal 120 volt receptacle. Strings of lamps or lampholders which are sold as part of rigid decorations, such as wreaths or frames, are included with—this definition. In addition, a lighting unit meeting these requirements would be within the definition even it contains additional electrical elements other than lamps, such as switches, or an additional lamp or lamps with dissipate more than 4 watts of power.

(j) "Overcurrent Protective Device" means a component such as a fuse or circuit protector that opens a circuit when the current becomes excessive.

(k) "Parallel Cord" means distinct wire conductors, with insulation between conductors, formed together in a single un-twisted cable.

(l) "Plug" See the definition of Attachment Plug.

(m) "Pole" means each of two parts of an electrical circuit at which opposite electrical forces are manifested.

(n) "Receptacle" means a contact device for connection of an attachment plug.

(o) "Series Circuit" means the connection of two or more lamps or lampholders in sequence in which one lamp or lampholder is electrically joined to the next such that all the circuit current will flow through each lamp and return to the source, and removal of any lamp would open the circuit and interrupt the current.

(p) "Shunt" means a device within a lamp which is intended to become operative upon failure of the filament. It provides a secondary current path and allows the string to continue to operate.

(q) "Socket"—See the definition of Lampholder.

(r) "String" means lampholders interconnected with wires terminating in an attachment plug or an add-on connector. The string may include other electrical components and/or decorative parts.

(s) "Wire" means a flexible, insulated electrical conductor.

(t) The definitions in Section 3 of the Consumer Product Safety Act (15 U.S.C. 2052) apply to this Part 1208.

§ 1208.4 Abbreviations.

The following is a list of some abbreviations used in this part.

AWG=American Wire Gauge
°C=Degree Celsius
°F=Degree Fahrenheit
ft=Foot
in=Inch
lbf=Pound Force
m=Meter
mm=Millimeter
N=Newton
rms=Root Mean Square

§1208.5 Materials.

(a) *Electrically Insulating Materials.* This subsection provides requirements for insulating materials. Other requirements for these materials are found in §§ 1208.7 and 1208.9. In this subsection, insulating materials are divided into three categories related to the functions of the insulating materials. The following is a description of the three categories and requirements for insulating materials which comprise each category.

(1) Class X—Class X materials do not directly contact, enclose, or support electrically live parts. Class X materials are used as shades, diffusers, reflectors, simulated needles and leaves, and supporting or decorative frames. Materials used for Class X purposes shall pass the Decorative Part Downward Burning Rate Test (1208.37), the Cascade Failure Simulation Test (1208.29), and the Short Circuit Simulation Test (1208.28) of Subpart B of this part.

(2) Class Y—Class Y materials contact or are relied upon to enclose or support electrically live parts whose steady current flow under normal operating conditions is limited by an overcurrent protective device rated at no more than 300 milliamperes. Class Y materials may include materials used as lamp bases, lampholders and certain shades and diffusers that are integrally molded as part of the lamp bases. Materials used for Class Y purposes shall pass the Decorative Part Downward Burning Rate Test (1208.37), the Cascade Failure Simulation Test (1208.29), the Short Circuit simulation Test (1208.28) and the Heating Test for Lamps and Lampholders (1208.38) of Subpart B of this part.

(3) Class Z—Class Z materials contact or are relied upon to enclose or support electrically live parts whose steady current flow under normal operating conditions is either not limited by an overcurrent protective device or is limited by an overcurrent protective device rated at more than 300 milliamperes. In addition, Class Z covers all materials, regardless of overcurrent protection, when used as insulation for wire, plugs, fuseholders and connectors. It also covers materials used for lampholders, lamp bases and other assemblies that are not Class X or Class Y applications. Materials used for Class Z purposes shall pass the appropriate component flammability tests (1208.21; 1208.27), the Cascade Failure Simulation Test, (1208.29) the Short Circuit Simulation Test (1208.28) and the Heating Test for Lamps and Lampholders (1208.38) of Subpart B of this part.

(b) *Conductive Materials.* (1) Electrically live parts, except for lamps, wire, and screwshell holders for lamps, fuses and other parts, shall be copper or an alloy that contains at least 60 percent copper by weight. For screwshell holders for lamps, fuses, and other parts, the materials shall be copper or an alloy that contains at least 80 percent copper by weight.

(2) Metallized tinsel and other conductive flexible strips and threads, 0.25 in (6.3 mm) and longer, and located within 1 in (25.4 mm) of a lampholder, fuseholder, plug or connector, shall pass the Conductive Tinsel Test of Subpart B (1208.41).

§ 1208.6 Wiring and assembly requirements.

(a) Wire conductors shall terminate in permanent electrical connections; that is, wire conductors shall not be used to routinely make and break electrical circuits. For lampholders with lamps removable by consumers, this means that wire conductors shall terminate at stationary plates, bars, or other connectors within lampholders which serve as the electrical contacts for making and breaking the electrical circuit whem lamps are inserted and removed from lampholders.

(b) The wire connecting two components shall be continuous and free of splices or taps.

(c) Wire within components shall be secured so that the conductor is not exposed and will not become exposed when tension is applied to the wire as described in the performance tests for components: Strain Relief Test for Plug and Connector Connections (1208.35), and Strain Relief Test for Lampholders, Fuseholders, and Other Bodies Except Plugs and Connectors (1208.23) of Subpart B of this part.

(d) The maximum non-transient current flow shall not exceed the value indicated in Table A for the corresponding wire size.

TABLE A.—*Wire current ratings*

Wire size, in American Wire Gauge (AWG):						
18	19	20	21	22	23	24
Current, in amperes:						
7	5	3	2.5	1.5	1.3	1.0

(e) A string having any wire conductors of cross-sectional area less than No. 20 AWG shall be provided with overcurrent protection so that there are two protective devices, one for each pole, located in the circuit between the attachment plug or add-on connector and the points where the conductor becomes smaller in size than No. 20 AWG. The rating of the devices shall not exceed 3 amperes. See also § 1208.8 for additional overcurrent protection requirements.

(f) Each miniature Christmas tree light set shall have an attachment plug or an add-on connector for connection to the power supply source.

(g) Wire that is not parallel cord, and has a conductor cross-sectional area less than that of No. 20 AWG wire, shall have two or more wires twisted together longitudinally except between components, such as lampholders, mounted on a frame. The maximum length of the lay of the longitudinally twisted wires shall be not more than 10 times the sum of the outside diameters of the wires which are twisted together.

(h) Except where otherwise specified, uninsulated live parts of opposite polarity shall be separated as specified herein. Also uninsulated live parts shall be separated from dead metal parts which are likely to be exposed to contact by persons as specified herein. The parts shall be separated by a space through air, and over surface of not less than 0.047 inch (1.19 mm). For purposes of this measurement, an unexposed dead metal part interposed between live parts of opposite polarity or between a live part and exposed dead metal is considered to reduce the spacing by an amount equal to the dimension of the unexposed metal part in the direction of the measurement.

(i) All electrically live parts (except for live parts of plug blades for power supply connection) shall be insulated or otherwise enclosed so that they cannot be contacted by the probe in figure 1.

§ 1208.7 Component Requirements.

This section sets forth the design and performance requirements for components of miniature Christmas tree lights.

(a) *Wire.* Wire shall conform to the specifications in table B.

(1) Wire conductors shall consist of individual copper conductor strands. The wire conductor shall meet the maximum breaking strength requirements as indicated in table B.

(2) The cross-sectional area of wire conductor shall not be less than 391 circular mils (0.198 square mm) and shall be one of the AWG numbers in table B. The allowable area tolerance is minus 3 percent. If the minus tolerance is exceeded, the wire will be considered to be the next higher AWG number. The AWG number signifies the total circular mil area, which is the sum of the circular mil areas of the individual conductor strands.

(3) Wire insulation shall be composed of polyvinyl chloride or a copolymer of vinyl chloride and vinyl acetate, with a minimum average insulation thickness and a minimum insulation thickness at any point of the wire, as indicated in table B.

(4) The distance between distinct conductors of parallel cord shall be at least 1.5 times the required minimum average thickness for the insulation given in table B.

(5) The thickness of insulation for conductors of a parallel cord shall be a minimum of 0.013 in. (0.33 mm) after the distinct conductors have been intentionally torn apart in either direction to separate the conductors.

TABLE B.—*Wire specifications*

AWG size of conductor	Cross sectional area		Maximum breaking strength (a)		Minimum average insulation thickness (b)		Minimum insulation thickness at any point	
	Circular mils	Square millimeters	Pound-force	N	Inches	Millimeters	Inches	Millimeters
18	1,620	0.823	49.1	218.0	0.023	0.58	0.021	0.53
19	1,290	.653	39.0	174.0	.023	.58	.021	.53
20	1,020	.518	31.0	138.0	.023	.58	.021	.53
21	812	.410	24.6	109.0	.023	.58	.021	.53
22	640	.326	19.4	86.3	.020	.51	.018	.46
23	511	.258	15.4	68.5	.020	.51	.018	.46
24	404	.205	12.7	56.5	.020	.51	.018	.46

(a) Based on a maximum pull rate of 12 in (305 mm) per minute with the conductor insulation removed.
(b) Average insulation thickness is the average of maximum and minimum thickness measured at each of five separate locations along the wire.

(6) Wire shall pass each of the following tests in table C:

TABLE C.—*Tests for wire*

Test	*Paragraph*
Insulation resistance	1208.13
Elongation and tensile strength	1208.14
Heat-shock	1208.15
Deformation	1208.16
Cold-bend	1208.17
Weathering	1208.18
Dielectric	1208.19
Abrasion	1208.20
Flammability	1208.21
Flexing	1208.22

(b) *Plugs and connectors.* (1) Attachment plugs and add-on connectors shall have their blades located parallel to one another spaced 0.500±0.005 inch (12.7±0.13 mm) on centers, and extending out from the face of the plug or connector at least 0.625 inch (15.88 mm) and no more than 0.718 inch (18.24 mm). The blade width shall be 0.250±0.010 inch (6.35±0.25 mm). Except as required in 1208.7(b)(2), the thickness of a blade shall be 0.060±0.005 inch (1.524±0.127 mm).

(2) Plugs and connectors with folded blades shall meet these additional requirements. Except for that portion of a blade within 0.25 inch (6.25 mm) of the face, the thickness of the blade shall be 0.060±0.005 inch (1.524±0.127 mm). Within 0.25 inch (6.35 mm) of the face the thickness of the blade shall not be greater than 0.065 inch (1.65 mm). In an attachment plug or add-on connector having spring-blades, in which only one end of each folded-over blades is secured, the metal stock shall be 0.028–0.032 inch (0.711–0.013mm) thick. In an attachment plug or an add-on connector having spring type folded-over blades in which both ends of each blade are se-

cured, the thickness of the metal stock shall not be less than 0.020 inch (0.508 mm).

(3) The face of attachment plugs and add-on connectors in which the blades project shall be in a plane perpendicular to the major axis of the blades. The face shall be a minimum of 0.50 inch (12.7 mm) by 0.875 inch (22.2 mm), with the blades centered and with a maximum radius of 0.22 inch (5.56 mm) at the corners. The 0.875 inch (22.2 mm) minimum dimension shall be perpendicular to the width of the blades. The blades shall be located in the middle of the face with maximum off-center distance of 0.0625 inch (1.59 mm) in any direction.

(4) The parallel slots in the receptacle faces of add-on connectors and end connectors shall be spaced 0.500±0.005 inch (12.70±0.13 mm) on centers. Slots shall be a minimum of 0.075 inch (1.90 mm), a maximum of 0.095 inch (2.41 mm) in width, and a minimum of 0.265 inch (6.73 mm) and a maximum of 0.285 inch (7.24 mm) in length. The distance across a receptacle face (for example, the diameter of a round face, or distance between opposite sides of a hexagonal face) of an add-on connector and an end connector shall be a minimum of 0.875 inch (22.22 mm). The receptacle slots shall be located in the middle of the face with a maximum off-center distance of 0.0625 inch (1.59 mm) in any direction.

(5) With the exception of phenolic or urea polymeric materials, electrically insulating materials shall be flame retardant as determined by the Flammability Tests for Class Z Applications of subpart B (1208.27). Pliable, molded, natural, or synthetic rubber, a combination thereof, the polymeric materials noted above, a polymer of vinyl chloride or a copolymer of vinyl chloride and vinyl acetate, shall be used for the insulating body of attachment plugs and connectors.

(6) Plugs and connectors shall be capable of withstanding a compressive load of 75 lbf (333.7 N) applied at right angles to the major axis of the plug blades or connector receptable cavities, as described in the Crush Test for Plugs and Connectors of subpart B (1208.34).

(7) Strings shall be capable of withstanding a pull on the wires leading to a plug or connector without detachment of the wire, exposure of live parts so that they can be contacted by the probe in figure 1, or cutting through wire insulation, as indicated by the Strain Relief Test for Plug and Connector Connections of subpart B (1208.35).

(8) Insulation on wires to plugs and connectors shall be prevented from slipping away from the plug or connector and exposing bare wire as determined by the Security of Insulation Test at Plugs and Connectors of subpart B (1208.36).

(9) Plug or add-on connectors shall enclose electrically energized parts, preventing them from being contacted by the probe depicted by figure 1 when sujected to blade push forces of the Plug and Connector Blade Push Test of subpart B (1208.33).

(10) Each blade of a plug or add-on connector, and the parallel blades tested together, shall be capable of withstanding a tensile force as determined by the Plug and Connector Blade Pull Test of subpart B (1208.32).

(11) Live parts within receptacle openings of add-on and end connectors shall not be capable of being contacted by the probe shown in figure 1.

(12) All wire terminations and other live parts of plugs and connectors shall be completely enclosed, except for receptacle openings on add-on and end connectors and blades projecting from plugs and add-on connectors. There shall be no dependence upon the use of separable covers or discs and parts which perform no function other than to provide strain relief. For purposes of this requirement separable covers and discs are those held in place by only friction without any positive detents, latches, screws, or fasteners.

(13) Receptacles shall enable a mating attachment plug or add-on connector to seat properly without exposing the blades between the plane of the face in which the blades project and the plane of the rim of the receptacle face as determined by the Receptacle Insertion-Withdrawal Tests in subpart B (1208.31).

(14) Plugs and connectors shall not have a temperature rise that exceeds 54° F (30° C), measured as described in the Temperature Test for Plugs, Connectors and Fuseholders of subpart B (1208.30).

(15) Plugs and connectors shall be capable of passing each of the following tests in table D:

TABLE D.—*Plug and connector tests*

Test	*Paragraph*
Plug and connector blade pull test	1208.32
Plug and connector blade push test	1208.33
Receptacle insertion-withdrawal test	1208.31
Strain relief test for plug and connector connections	1208.35
Security of insulation test at plugs and connectors	1208.36
Crush test for plugs and connectors	1208.34
Temperature test for plugs, connectors, and fuseholders	1208.30
Flammability tests for class Z applications (except wire)	1208.27

§ 1208.8 Overcurrent protection.

(a) In addition to the overcurrent protection requirement in § 1208.6(e), lamps shall be protected by overcurrent protective devices that prevent ignition under short circuit conditions with one or more lamps in the shorted circuit as determined by the Short Circuit Simulation Test of subpart B (1208.28). The shorted circuit may be between electrically live parts of opposite polarity or between electrically live parts and ground. In figure 2, overcurrent protective device pair A, A′ serves the entire string; overcurrent protective device pair B, B′ serves the group of lamp series circuits; and each overcurrent protective device pair C, C′ serves an individual lamp series circuit.

(b) Overcurrent protective devices shall be rated at ½ of the current that causes the protective device to open within 2 minutes when operated at room temperature.

(c) If replaceable fuses are used there shall be no electrically live parts of the fuse or holder that can be contacted by the probe in figure 1 during removal and replacement of the fuse.

(d) Insulation materials used for enclosures or holders of overcurrent protection devices must comply with the requirements for class Z materials at § 1208.5(a)3.

(e) Holders for replaceable fuses shall not accommodate the bases of non-fuse lamps used in the string.

(f) If fuses of the string are replaceable, at least one spare fuse, of the original fuse type, shall be provided with the product.

(g) Overcurrent protective devices are subject to the following tests in table E:

TABLE E.—*Tests for overcurrent protection device holders*

Test	Paragraph
Temperature test for plugs, connectors, and fuseholders	1208.30
Flammability test for class Z applications (except wire)	1208.27
Strain relief test for lampholders, fuseholders, and other bodies (except plugs and connectors)	1208.23
Crush test for lampholders and fuseholders (other than types which are incorporated in plugs and connectors)	1208.26

§ 1208.9 Lamps and Lampholders.

(a) Lampholders shall provide a spacing of not less than 0.030 inch (0.76 mm) through air and over surfaces between electrically live parts and dead metal parts. Electrically live parts of a lampholder shall be recessed at least 0.20 inch (5.08mm) from the lamp entry end of the lampholder.

(b) Lampholders shall have no conductive parts, live and dead (nonenergized), that can be contacted by the probe shown in Figure 1, before, during, or after the insertion of a lamp for which the lampholder is intended with the lamp and lamp contacts in any position permitted by the design.

(c) Lampholders and lamps shall withstand a dielectric breakdown be-

tween the electrically live parts and the outer surfaces of the assembly in accordance with the Dielectric Test for Lampholder and Lamp Assembly of Subpart B (1208.25).

(d) Lampholders, without lamps, shall not crack or expose electrically live parts when subjected to crush forces in accordance with the Crush Test for Lampholders and Fuseholders (Other Than Types Which Are Incorporated in Plugs and Connectors) of Subpart B (1208.26).

(e) Lampholders contacts shall be affixed within the lampholders in a way that will not permit displacement in accordance with the Secureness of Lampholder Contacts Test of Subpart B (1208.24).

(f) Wires within the lampholder shall be affixed so that when forces are exerted on the wires, there will be no exposure of electrically energized parts as specified by the Strain Relief Test for Lampholders, Fuseholders and Other Bodies Except Plugs and Connectors of Subpart B (1208.23).

(g) Miniature Christmas tree lights and decorations shall have lamps with only one operating voltage, unless the lamps are fuse lamps.

(h) Lamps that have shunts shall not be used in series circuits having fewer than 10 lamps or lampholders.

(i) Miniature Christmas tree lights and decorations shall have insulating materials, in accordance with § 1208.5(a). All materials are subject to the Decorative Part Downward Burning Rate Test of Subpart B (1208.37).

(j) The insulating body of a lamp and lampholder shall withstand thermal conditioning at a temperature no lower than 248° F (120° C) for no less than 2 hours with no softening or melting of the material that exposes electrically live parts in accordance with the Heating Test for Lamps and Lampholders of Subpart B (1208.38).

(k) The millivolts drop between the terminals of a lampholder shall not exceed 200 millivolts in accordance with the Millivolts Drop Test for Lampholders of Subpart B (1208.39).

(l) A lamp shall not be able to dissipate a wattage equal to 2.5 times the area of the outside glass bulb surface above the base in square centimeters or 1.25 times the minimum diameter of the lamp (the outside surface of the bulb) in the location of the filament in millimeters, whichever value is less, for more than 2 minutes in accordance with the Maximum Wattage Test for Lamps of Subpart B (1208.40).

(m) Lamps and lampholders shall be capable of passing each of the following tests in Table F:

TABLE F.—*Lamps and lampholders tests*

Test	Paragraph
Cascade failure simulation test	1208.29
Short circuit simulation test	1208.28
Heating test for lamps and lampholders	1208.38
Millivolts drop test for lampholders	1208.39
Strain relief test for lampholders, fuseholders and other bodies except plugs and connectors	1208.23
Secureness of lampholder contacts test	1208.24
Crush test for lampholders and fuseholders (other than types which are incorporated in plugs and connectors)	1208.26
Dielectric test for lampholder and lamp assembly	1208.25
Maximum wattage test for lamps	1208.40
Flammability tests for class 2 applications (except wire)	1208.27
Decorative part downward buring rate test	1208.37

TABLE F.—*Lamps and lampholders tests*—Continued

§ 1208.10 Required Packaging and Labeling.

(a) *Scope.* Miniature Christmas tree lights and similar miniature decorative lights shall meet the packaging and labeling requirements of this section. All cautionary statements required by this section to appear on any package or tag, shall be prominent and shall be conspicuous and legible and in contrast by typography, layout, or color with other printed matter. CPSC regulations at 16 CFR 1500.121 provide type size, placement, and other requirements for cautionary labeling under the Federal Hazardous Substances Act (FHSA) (15 U.S.C. 1261). Those regulations indicate how labeling can meet the requirements of the FHSA that labeling appear prominently and conspicuously on the label of a hazardous substance. The Commission suggests that the FHSA regulations at 16 CFR 1500.121 be used as guidelines as to whether labeling required in this standard is prominent, conspicuous and legible.

(b) *Labeling on Light String and Package.* Miniature Christmas tree lights shall have the following information on a label located between the plug and the first lampholder and permanently affixed to the light string: (16 CFR 1500.121(f) may be referred to for determining placement and conspicuousness for these statements).

(1) On one side of the permanently affixed label the following information must appear:

(i) The signal word "Caution or Warning";

(ii) The following statement of hazard: "To avoid fire or shock hazards";

(iii) The additional cautionary information

"Do not use on trees with metal or metallic needles, leaves or branch covering."

"Do not use staples or sharp-edge fasteners which can damage insulation."

"use only decorations over lamps if provided with light set."

(iv) Complete name and mailing address of the domestic manufacturer, domestic importer, distributor, or private brand seller;

(v) The manufacturers identification number (may be in code), indicating the style number or name, the lot number, and the year of manufacture;

(vi) The following statement or parts thereof, as applicable: "Use the following chart to safely replace bulbs and/or fuses:

Lamp: —— volts.
Fuse (when fuseholder can accommodate glass tube cartridge type fuse): —— amps, —— min. volts.
Fuse (when fuseholder designed to accommodate fuse other than glass tube cartridge type): replacement model number or equivalent.

(2) The labeling which is required by paragraph (b)(1) of this section shall also appear together prominently and conspicuously on the display panel of the package in which miniature Christmas tree lights and similar miniature decorative lights are displayed for sale to the public.

(c) *Labeling for Spare Bulb.* The following information shall appear on an envelope containing any spare bulb that is provided with the miniature Christmas tree light or similar miniature decorative light:

(1) The voltage of the bulbs;

(2) The manufacturer's identification number (may be in code).

Subpart B—Tests

NOTE.—Unless specified elsewhere in this subpart, tests are to be conducted at ambient air temperatures within the range 66°F (18.9°C) to 84°F (28.9°C) inclusive.

§ 1208.13 Wire Insulation Resistance.

The conductor length of the test specimen shall be a maximum of 5,000 ft (1,524 m). The test voltage shall be between 200 and 1,000 volts direct current inclusive. The measurement shall be made after 1 minute at the test voltage. Measured in room temperature tap water, when the specimen has been immersed for a minimum of six hours, the insulation resistance shall be at least 2.5 (1000)/L megohms, where L is the conductor length of the test specimen in feet, or 2.5 (304.8)/L megohms, where L is the length of the test specimen in meters.

§ 1208.14 Wire Insulation Elongation and Tensile Strength.

(a) For purposes of this test, a specimen consists of not less than a 6 inch (152 mm) length of complete tube formed by the insulation, except that in the case of parallel cords the specimen is the unseparated multiple tube. In order to prepare the specimen remove individual strands of the conductor from the insulation without damaging the insulation specimen.

(b) For purposes of this test, an aged sample is one which has been placed

in a circulating-air oven, suspended vertically so that it does not touch the oven sides or other specimens, and maintained at an oven temperature not less than 212°F (100°C) for 168 hours.

(c) After aging some of the samples, remove them from the oven and keep them at a room temperature of 75.2±14.4°F (24.0±8.0° C) for at least 16 and not more than 96 hours. The unaged samples must be kept at this room temperature for at least 30 minutes.

(d) Use an apparatus that indicates the actual maximum load at which a specimen breaks. If an apparatus with a spring balance is used, be certain that recoil of the spring is prevented.

(e) Clamp each specimen in position with two gauge marks, 2 in (51 mm) apart, located outside of and between the grips. Adjust the movable grip to make the specimen taut, but not under tension. Then adjust the grip so that it moves at a speed of at least 20 inches (510 mm) per minute. In as must as the width of a mark increases when a specimen is stretched, make the measurement of elongation with reference to the center of each guage mark; that is, a point halfway between the edges of each mark. Allow the apparatus to separate the grips until the specimen breaks. Note the distance between the gauge marks at the time of the break. For an unaged specimen to pass the test, the elongation must be a minimum of 4 inches (102 mm) (200 per cent), and the minimum tensile strength of the wire insulation must be 1600 lbf/in (11.03 magepascals). For an aged specimen to pass the test, the minimum elongation of the wire insulation must be 50 percent of the result obtained with the unaged specimens, and the minimum acceptable tensile strength must be 85 percent of the result obtained with unaged specimens.

(f) For purposes of this test, elongation is the increase in distance between the guage marks, and tensile strength is the measured load which ruptures the specimen divided by the cross sectional area of the unaged specimen.

§ 1208.15 Heat-Shock Test for Wire Insulation.

(a) Each specimen of wire is to be wound tightly for six complete turns around a mandrel having a diameter of 0.094 in (2.4 mm). Successive turns are to be in contact with one another, and both ends of the specimen are to be securely held in place by friction tape.

(b) Each mandrel with wire attached shall be subjected to a temperature of not less than 250°F (121°C) in a circulation air-oven for one hour. The wire insulation shall be inspected for cracks while the wire is on the mandrel when it is removed from the oven. The wire insulation must not show any cracks on the surface as determined by the use of 0.002 inch (0.051 mm) guage. If the guage enters the plane of the surface when inserted into cracks located on the wire, the wire does not pass.

§ 1208.16 Deformation Test for Wire Insulation.

For purposes of test, the insulation thickness of an insulated conductor is the average diameter over the insulation minus the diameter of the conductor, with the difference divided by two. The average diameter is the average of maximum and minimum diameters measured at each of five separate locations along the wire. On a 1 inch (25.4 mm) or longer length of insulated conductor, measure the insulation thickness with a loading mechanism consisting of a dead-weight dial micrometer with a presser foot 0.375 inch (9.52 mm) in diameter that exerts a force of at least 0.1808 lbf (0.805 N) on the specimen. Following this, place the test specimen and the loading mechanism so that they are not in contact with each other in a circulating-air oven, maintained at a temperature not less than 250°F (121°C). After one hour, the micrometer is to be placed on the specimen with the force exerted by the micrometer plus additional force to equal a total of 0.552 lbf (2.46 N) for wire with conductors smaller in size than No. 20 AWG, and 0.882 lbf (3.93 N) for wire conductors No. 20 AWG and larger in size. After one hour at this force, and while in the oven, measure the insulation thickness. To pass the test the insulation thickness under the force must not be less than 50 percent of the initial measurement.

1208.17 Cold-Bend Test for Wire Insulation.

Subject a wire specimen and a 0.25 inch (6.35 mm) diameter mandrel to a temperature of —31°F (—34.9°C) for one hour. While maintaining the wire specimen and mandrel at that temperature, wind the wire tightly for six complete turns around the mandrel, at the rate of about 3 seconds per turn (18 ± 3 seconds for six turns). Successive turns are to touch one another. Maintain the wire tightly wrapped around the mandrel. To pass the test, wire insulation must show no cracks when inspected with the wire on the mandrel as determined by the use of a 0.002 inch (0.051 mm) guage. If the gauge enters the plane of the surface when inserted into cracks located on the wire, the wire does not pass.

§ 1208.18 Weathering Test for Wire Insulation.

(a) To pass this test, wire insulation that has been subjected to simulated outdoor weathering shall exhibit tensile strength and ultimate elongation not less than 80 percent of those of unweathered specimens. For this test, outdoor weathering shall be simulated by exposure of wire to a source of ultraviolet light and water spray in an artificial weathering apparatus as described in the following paragraph.

(b) The weathering test equipment shall be xenon are (water-cooled) Weather-Ometer employing a lamp rated at 6500 watts and automatic light monitoring and control systems. Borosilicate inner and outer filters shall be used. The wire specimens shall be mounted verticially on the inside of the specimen drum. The specimen drum is to rotate at one revolution per minute. The specimens shall be exposed to a radiant flux of 323 microwatts per square inch (50 microwatts per square centimeter or 12 calories per second per square centimeter) while monitoring at a wave length of 3400 angstroms (340 nanometers). A continous water spray cycle of 3 minutes on followed by 17 minutes off shall be used throughout the test. The temperature within the apparatus while in operation but with the spray off shall be 145.±9.0° F (63.0±5.0° C). The specimens are to be retained in the Weather-Ometer for a period of 1253 hours.

(c) After 1253 hours have elapsed, cool the samples to room temperature and then remove them from the apparatus. Remove the conductors from the insulation, and then test the insulation for tensile strength and elongation as directed in the test by that mamo.

§ 1208.19 Dielectric Tests for Wire Insulation.

(a) The insulation on wire must withstand without breakdown for a period of 1 minute the application of a 60 hertz sinusoidal potential of 1250 volts rms between the conductor and conductive foil tightly wrapped over the wire (except not wrapped over the ends of the wire).

(b) The insulation on the individual conductors which are joined together to form an integral multiconductor cords must withstand for one minute without breakdown between conductors the application of a 60 hertz sinusoidal potential of 1250 volts. The test potential is to be applied between each ciricult conductor and every other circuit conductor. For each test, the applied potential is to be increased from zero at a uniform rate that is not less than 125 volts in 60 seconds, and is not more than 500 volts per second. The increase is to continue in this manner until the voltage reaches the level specified above. If this level is reached without breakdown, the voltage is to be held constant at the specified level for 60 seconds and is then to be reduced to zero at the rate mentioned

above. If the wire insulation withstands these tests without breakdown, the wire insulation passes.

§ 1208.20 Abrasion Test for Wire Insulation.

(a) The insulation on wire must not wear through to expose the conductor in 400 or fewer cycles of the abrasion procedure described in the following paragraphs.

(b) Straight specimens of insulated wire are to be tested without any conditioning. One end of each specimen is to be attached to a reciprocating table or equivalent while the table is at one end of its travel. The other end of each specimen is to be attached so that there is a tensile force not less than 0.25 lbf (1.11 N). Each specimen is to be placed over a quarter cylinder to whose outer surface an unused sheet of medium grade emery cloth (½) is attached. The radius of the surface of the emery cloth is to be 3.5±0.25 inches (89±6 mm). The longitudinal axis of the quarter cylinder is to be perpendicular to each of the planes that contain the specimens as they move on, and are abraded by, the emery cloth. The table or equivalent is to be started in its reciprocating motion (simple harmonic motion) at the rate of between 20 and 30 cycles per minute inclusive, each cycle consisting of one complete back and forth motion with a stroke of not less than 6.25 inches (159 mm). The table is to be stopped every 50 cycles and the emery cloth is to be shifted slightly to one side so that in subsequent cycles each specimen is abraded by a fresh surface of the cloth. The wire is not acceptable in the size being tested if the strands are exposed anywhere on any of the specimens in 400 or fewer cycles of the abrasion.

§ 1208.21 Flammability Test for Wire Insulation.

(a) A length of wire is to be held taut in a horizontal position between two supports in a chamber approximately 24 inches (610 mm) long, approximately 12 inches (305 mm) wide, and approximately 12 inches (305 mm) high, open at the top and on one long side to permit an air flow of not greater than 30 ft (9.14 m) per minute. Dry absorbent surgical cotton is to be placed over the bottom of the test chamber, with no more than 9 inches (229 mm) between the cotton and the test specimen. The specimen is to be marked at distances of 2 inches (51 mm), 7 inches (178 mm), and 13 inches (330 mm) from one point of support of the wire. The flame from a Bunsen or Tirrill burner using methane gas is to be applied for 30 seconds to the sample at the 2 inch (51 mm) mark with the burner in a vertical position, and the tip of the blue inner flame applied to the underside of the wire. The barrel of the burner, having a bore of 0.375 inch (9.52 mm) and a length of approximately 4 inches (102 mm) above the primary air inlets, is to be adjusted to give a 2 inch (51 mm) flame with the blue inner cone equal to one third of the flame height. If the sample flames, the time of flaming is to be recorded as the time required for the flame to progress along the marked 6 inch (152 mm) section (between the 7 inch (178 mm) and 13 inch (330 mm) marks).

(b) If the sample does not flame, or if the flaming extinguishes before reaching the 13 inch (330 mm) mark, or if the finished wire shows a rate of flaming no greater than 1 inch (25.4 mm) per minute, and no flaming particles or drips falling from the sample ignite the cotton, the test is passed.

§ 1208.22 Flexing Test for Wire.

(a) Bend each specimen into the form of a flat-bottomed, square-cornered U with the legs of the U straight and of equal length. Tape the bottom of the U to the side of a movable round rod (A in Figure 3) with the axis of the conductor or conductors parallel to the longitudinal axis of the movable rod and the legs of the U extending perpendicular to the longitudinal axis of the movable rod between a pair of fixed round rods (B in Figure 3) that are 0.25 inch (6.35 mm) in diameter. Apply full force of 0.75 ounce force (0.209 N) to the free end of each leg. The longituinal axes of the two fixed rods are to be equidistant from the movable rod before the flexing motion begins, and continually parallel to one another and to the longitundinal axis of the movable rod to which the speciments are taped. The distance between the two fixed rods is to result in the specimens being midway between the rods with a space from specimen to rod of not less than 0.0156 inch (0.397 mm), and not more than 0.0625 inch (1.59 mm).

(b) While passing the current that is indicated in Table A through the conductors, operate the movable rod in the pivoted motion (simple harmonic motion) depicted by the broken lines in Figure 3, at the rate of between 10 and 15 cycles per minute inclusive, each cycle consisting of one complete back and forth motion through an angle of 180 degrees centering about the points of flexure. After 6000 cycles stop the motion. Cut each specimen open and examine for broken strands at the points of flexure against the two fixed rods. The wire is acceptable in the size tested if half or fewer than half of the strands are broken in each leg of the specimens tested.

§ 1208.23 Strain relief test for lampholders, fuseholders and other bodies except plugs and connectors.

(a) The connection of wires to a body must be capable of withstanding a single pull of 8 lbf (35.6 N) applied to each of the wires individually, and to all possible combinations of the wires, in any direction. Each pull is to last for at least one minute. If a knot in the wires is provided outside the body, the pull is to be applied to each of the wires, with the knot between the point of application of the pull force and the body, without undoing the knot. Lampholders are to have lamps inserted and fuseholders are to have fuses inserted during the tests of those bodies.

(b) *Wire Pull—Method 1.* The body is to be secured in a manner that does not additionally support the wire connection, an example of which is shown in Figure 4.

(c) *Wire Pull—Method 2.* (1) The pull is to be applied between all combinations of any two wires to the body. The body shall not be secured for this test. See Figure 5.

(2) The results are considered acceptable if no live part becomes exposed as a result of a pull. Exposure means being contacted by the probe in Figure 1 before, during or after a pull on the conductor. In addition, a wire conductor is considered to be exposed before, during and after the pull if the end of the wire insulation does not enter the plane of the wire entry opening. Breakage of the wire conductor constitutes a failure, unless the break occurs at the jaws or attachment of the wire to a pulling device, in which case the results are to be discarded and another sample tested.

§ 1208.24 Secureness of lampholder contacts test.

(a) The reliability of the secureness of the contacts is to be determined in their as-received condition, following 7 hours of normal operation of the string in a position tending to cause the greatest heating of the lampholder, and then cooling to room temperature. The test force of 2 lbf (8.9 N) is to be applied for no less than 1 minute in a direction tending to force the contacts out of the lampholder after removing the lamp. The force is to be applied to each of the wires individually, and to all possible combinations of the wires exiting from the lampholder 0.125±0.031 inch (3.18±.79 mm) from their point of entry into the lampholder body.

(b) To pass the test, there must be no displacement of the contact in excess of 0.031 inch (0.79 mm) or which allows an electrically live part to be touched by the probe shown in Figure 1.

(c) Exception: If a knot in the wires is provided outside the body of the lampholder as a means of securing the contacts, preventing the attachment of the clamping device 0.125 inch (3.18 mm) from the lampholder body, the clamp is to be secured immediately adjacent to the knot on the side away from the lampholder.

§ 1208.25 Dielectric test for lampholder and lamp assembly.

(a) To pass this test, the assembly of a lampholder and lamp must withstand without breakdown, for a period of 1 minute, the application of a 60-hertz sinusoidal potential of 1,250 volts, with the voltage increased from zero at a rate not to exceed 500 volts per second, between the electrical conductors and metal foil placed over the assembly and arranged to conform to its shape. The wire leads to the lampholder may serve as the electrode for the electrical conductors within the assembly.

§ 1208.26 Crush test for lampholders and fuseholders (other than types which are incorporated in plugs and connectors).

(a) A complete lampholder without a lamp or fuseholder without a fuse, with wires attached, shall be tested.

(b) A lampholder or fuseholder is placed between two flat surfaces parallel to each other and parallel to the major axis of the holder. Apply 16 lbf (71.2 N) compressive force perpendicular to the major axis and to the plane of the flat surfaces against the holder. For lampholders and fuseholders with open ends for lamp or fuse insertion, the force is to be applied at the open end for 1 minute and distributed along the holder body from the edge of the opening to a point no further than 0.20 inch (5.08 mm) from the edge. To pass the test, there must be no cracks or exposure of electrically energized parts that can be contacted with the probe in Figure 1.

§ 1208.27 Flammability tests for class Z applications (except wire).

(a) Test specimens are to be conditioned for at least 40 hours at a temperature of 73.4±3.6° F (23.0±2.0° C) and a relative humidity of 50±5 percent prior to testing. Other test specimens are to be conditioned in a circulating air oven for not less than 168 hours at 158° F (70° C) and then cooled in a desicator, over anyhdrous calcium chloride, for at least 4 hours at room temperature prior to testing. The test is to be conducted in a chamber, with an air flow no greater than 30 ft (9.14 m) per minute.

(b) Each specimen is to be supported from the upper 0.25 inch (6.4 mm) of the specimen, with the longitudinal axis vertical, by a clamp on a ring stand or the equivalent so that the lower end of the specimen is 0.375 inch (9.5 mm) above the top of the burner tube during flame application and 12 inches (305 mm) above a horizontal layer of dry absorbent surgical cotton (2 by 2 inch (51 by 51 mm) swatch thinned to a maximum free standing thickness of 0.25 inch (6.4 mm)).

(c) A Bunsen or Tirrill burner having a bore of 0.375 inch (9.52 mm) and a length of approximately 4 inches (101.6 mm) above the primary air inlets, using methane gas, is then to be ignited and adjusted to produce a blue flame 0.75 inch (19 mm) high. The flame should be obtained by adjusting the gas supply and the air ports of the burner until a 0.75 inch (19 mm) yellow-tipped blue flame is produced and then an increase in the air supply is to be made until the yellow tip disappears. The height of the flame is to be measured again and corrected to 0.75 inch (19 mm) if necessary.

(d) The test flame is to be brought to a central location under the lower end of the test specimen and allowed to remain for 10 seconds. The test flame is then to be withdrawn at least 6 inches (152 mm) away and the duration of flaming of the specimen noted. When flaming of the specimen ceases, the test flame is to be immediately placed again under the specimen. After 10 seconds, the test flame is again to be withdrawn, and the duration of flaming and glowing is to be noted. The illumination in the area when the test is performed shall not exceed 0.3 foot-candles.

(e) If the specimen drips molten or flaming material during either flame application, the burner may be tilted to an angle up to 45 degrees and also slightly withdrawn away from one of the sides of the specimen during the flame application to avoid materials dripping into the tube of the burner. If the specimen drips molten or flaming material or is consumed during the test, the burner is to be hand-held, and the 0.375 inch (9.5 mm) distance between the bottom of the specimen and the top of the burner tube is to be maintained during the flame application. Any molten strings of the material are to be ignored, and the flame is to be applied to the major portion of the specimen.

Observe and record the following:

(A) Duration of flaming after first flame application.

(B) Duration of flaming after second flame application.

(C) Duration of flaming plus visible glowing after second flame application.

(D) Whether or not specimen drips flaming particles which ignite cotton swatch.

(f) To pass the test, a test sample must not burn with flaming combustion for more than 10 seconds after each application of the test flame; no specimen may drip flaming particles that ignite the dry absorbent surgical cotton located 12 inches (305 mm) below the test specimen; and no specimen may have glowing combustion which persists beyond 30 seconds after the second removal of the test flame.

§ 1208.28 Short circuit simulation test.

(a) Electricial supply circuits of 125 volts, 60 hertz, calibrated to deliver 200 amperes to the string under short circuit conditions; and 125 volts, 60 hertz, calibrated to deliver 1,000 amperes to the string under short circuit conditions; each protected by a 20 ampere circuit breaker shall be used.

(b) This test is to be conducted on a string placed on a bed of dry absorbent surgical cotton. If the string has more than one lamp series circuit, the test must be performed using only one of those circuits the one with the longest length of wires between the plug and the first lampholder in the circuit. The test must be conducted with lamps having shunts (if used).

(c) Trace one wire from the plug to the first lampholder in the lamp series circuit that is provided with or can accommodate a lamp having a shunt (if used). Cut the wire midway between that lampholder and the next lampholder in the series circuit. If lamps without shunts are used exclusively, cut wire midway between the second and third lampholder. Strip the insulation from the wire extending from the first lampholder. Cut the wire between the plug and the last lampholder of the series string. Strip insulation from the wire extending from the plug. Twist the ends of the two stripped wires firmly together. Place dry absorbent surgical cotton over the complete test sample. Connect the plug to the 200 ampere electricial supply circuit, and by means of a switch, energize the test circuit. Repeat the test on another sample with one less lampholder in the circuit until only the overcurrent protective device is in the test circuit.

(d) Repeat the above steps on the 1,000 ampere electrical supply circuit. The test is passed if there is no breakage of the glass envelope of a lamp or fuse (if used), no expulsion of fragments from the test sample, and no ignition of the surrounding cotton.

§ 1208.29 Cascade failure simulation test.

(a) In this simulation, a lamp series circuit is represented by a single lamp, lamp base, and lampholder with wires attached, and a variable resistor or equivalent. The lamp, lampbase and lampholder together comprise a lamp assembly. The circuit is operated with the overcurrent protective devices which normally serve the circuit.

(b) Figure 6 shows a schematic diagram of the test circuit for the simulation of a cascade failure in a string where a pair of overcurrent protective devices serves only one lamp series circuit. For the simulation where a pair of overcurrent protective devices serves more than one lamp series circuit, the lamp series circuits that are in addition to the one circuit being represented by the lamp assembly and variable resistor, are to be electrically connected in parallel to the lamp assembly and variable resistor. At least

one of the additional lamp circuits is to be open circuited during the test.

(c) In general, the test will require the use of components from more than one string. Select the lamps for the string under test that have the hottest operating bulb surface temperatures. Decorative parts around the lamp, lampbase, and lampholder are to be in place during the test except as noted below. Additional fuses (if used) are to be obtained from other strings of the identical type.

(d) An unenergized lamp assembly from the same string or one of the identical type must be rested on top of the lamp assembly under test such that the part of the unenergized lampholder at which the internal contacts are closest to the surface is touching the bulb envelope of the tested assembly at a point as close as possible to the lamp filament. This may require rotating the lamp assembly under test so that the point at which its lamp filament is closest to the bulb envelope is also the point that contacts the unenergized lampholder. Maintenance of this contact is required throughout the test. For a string supported on a frame where the lampholders are separated to prevent lamps from contacting adjacent lampholders, the unenergized lamp assembly placement step noted herein may be omitted.

(e) For light strings with decorative parts around the lamp, lampbase, or lampholder that can be removed, the Cascade Failure Simulation Test must be performed both with and without the parts in place. In this situation, the above requirement that an unenergized lamp assembly be placed over the lamp assembly under test applies only when the decorative parts are not in place.

(f) To determine the normal current flow in a lamp series circuit, replace all lamps that operate intermittently (for example, bulbs that have thermally actuated internal contacts to alternatively open and close the series lamp circuit) with steadily burning lamps, and connect the string to a 120 volt, 60 hertz power supply. Measure the current. For multiple series circuit strings, measure the current in each lamp series circuit and calculate its average value. This is considered to be the normal lamp current. The variable resistor must have a resistance range up to at least 10 percent greater than the operating resistance of a lamp series circuit.

(g) Remove lamp assemblies by cutting the wires between each assembly selected and the nearest adjacent assemblies. Connect one assembly in the appropriate test circuit as shown in Figure 6. With the variable resistor at the maximum setting, connect the test circuit to the power supply. Increase the current through the assembly by adjusting the variable resistor until the previously determined normal lamp circuit current is reached and hold this value for a 5 minute±20 second period. After this period, increase the current to a value that is 20±1 percent below the maximum current that either the overcurrent protective devices or the lamp filament would pass (whichever is lower) if the current were increased from the normal current at a rate approximately 10 milliamperes every 10 seconds; these points having been previously determined by successive trials.

(h) If there is no discernable physical change in appearance, such as melting or dripping of materials, after 10–11 minutes increase the current in successive steps of 5 percent of the previous value, maintaining each step for a 5–6 minute period. If there is discernable physical change in appearance at any step, continue operation at that step for an additional 5–6 minutes. Continue this stepping process until either the lamp filament or the overcurrent protective device opens the circuit. For a valid test, the filament must operate for at least 10 minutes at a current above the normal value. If repeated samples open-circuit before the required 10 minute operating period is complete, reduce the value of the first over-current step by 5 percent and repeat the test on additional samples.

(i) If the lamp filament opens and the lamp shunt and overcurrent protective devices are still operational, increase the current in successive steps equal to 10 percent of the overcurrent protective device rating, maintaining each step for a 3–4 minute period. If there is discernable physical change in appearance at any step, continue operation at that step for an additional 10–11 minutes. Continue this stepping process until either the lamp shunt or the overcurrent protective device opens. If desired to save time, the lower current steps which begin after the filament opens, may be omitted so long as at least three consecutive steps are passed through just prior to opening either the lamp shunt or the overcurrent protective device.

(j) To pass the test, there must be no exposure of electrical conductors either in the lamp assembly under test or in the unenergized lampholder over it such that they can be contacted by the probe in Figure 1 and there shall be no ignition of any parts of the string during the test.

§ 1208.30 Temperature Test for Plugs, Connectors and Fuseholders.

(a) To pass this test, wire terminations and other live parts of plugs, connectors, and fuseholders must operate at 15 amperes with a maximum temperature rise of 54°F (30°C), except that: (1) Attachment plugs, and connectors and fuseholders (but not add-on connectors) are to be operated at the current rating of the connecting wire with a maximum temperature rise as set forth above; and (2) circuits protected by non-replaceable or non-interchangeable overcurrent protection devices are to be operated at the maximum value at which the device will operate continuously for at least two hours without the overcurrent protection devices opening the circuit (except as provided under paragraph (a) of this section), with a maximum temperature rise as set forth above.

(b) When testing plugs and add-on connectors, the connections to the blades are to be made to minimize heating from the connection. When testing receptacles, the receptacle contacts are to be tested together by means of an inserted attachment plug. They are to be tested after having been subjected to the overload test described in the following paragraph.

(c) Overload Test: Insert and withdraw an attachment plug having rigidly secured solid blades which are connected through a flexible cord to a load. Cause the connector to make and break 22.5 amperes (except that end connectors are to make and break 150 percent of the current rating of the connecting wire) for 50 cycles of operation at a rate no faster than 10 cycles per minute. The blade of the plug is to mate with the receptacle contact for no more than 1 second during each cycle.

(d) The unrestricted attachment plug is to be inserted and withdrawn with an average velocity of 30±3 inches (762±76 mm) per second in each direction during a 2.5 inch (63.5 mm) stroke measured from the fully inserted position. The potential of the test circuit is to be 120 volts ac, with the power factor between 0.75 to 0.80 inclusive.

(e) To pass this test, there must be no electrical or mechanical failure of the connector, or undue burning or pitting of the receptacle contacts.

§ 1208.31 Receptacle Insertion-Withdrawal Tests.

(a) This test is to be conducted using an attachment plug or add-on connector having solid blades which are 0.260 inch (6.60 mm) wide, 0.065 inch (1.651 mm) thick, and extend out 0.718 inch (18.24 mm) from the face of the plug or connector.

(b) The force needed for initial insertion of the blades of an attachment plug and add-on connector into the receptacle of a connector to within at least 0.0313 inch (0.793 mm) of full insertion must not exceed 20 lbf (89 N). The force needed to withdraw the blades after the first insertion and subsequent insertions must not exceed 15 lbf (66.75 N). The force needed for subsequent insertions of the blades to within at least 0.0313 inch (0.793 mm)

of full insertion must not exceed 15 lbf (66.75 N). After 10 conditioning cycles of insertion and withdrawal of the blades, a pull of 3 lbf (13.35 N) in a direction normal to the face of the receptacle body and tending to withdraw the blades is to be applied for one minute. The results are acceptable if there are no exposed live parts that can be contacted by the probe in Figure 1.

(c) To pass the test, electrically live parts of a connector must remain insulated or enclosed as a result of the insertion and withdrawal forces so that they can not be contacted with the probe in Figure 1.

(d) In addition, to pass the test, the blades must not be accessible following the application of the insertion forces described in the previous paragraph using a 0.0313 inch (.793 mm) thick feeler gauge whose width is not less than 0.20 inch (5.08 mm).

§ 1208.32 Plug and Connector Blade Pull Test.

(a) Support plugs and add-on connectors so that tensile forces can be applied to the blade or blades along their longitudinal axes without restricting possible displacment of the blades and/or breakage of the enclosure of electrically live parts.

(b) Apply a 20 lbf (89 N) to each blade in succession and to the two blades tested together. Maintain each force for two minutes.

(c) The test is passed if a blade is not displaced more than 0.094 inch (2.38 mm). Measurements are to be made not less than 2 minutes nor more than 4 minutes after removal of the force.

§ 1208.33 Plug and Connector Blade Push Test.

(a) Support plugs and add-on connectors so as not to restrict possible displacement of the receptacle contacts and/or breakage of the enclosure of electrically live parts. Subject each blade, in turn, to a force of 35 lbf (155.6 N) applied gradually along the longitudinal axis of the blade in a direction toward the face of the plug or connector in which the blades project. Maintain the force for a period of one minute. This test is passed if neither blade is displaced more than 0.094 inch (238 mm) and the enclosure is not opened to expose electrically live parts so that they can be contacted by the probe in Figure 1 (except for the blades projecting as intended from the face of the plug or connector) as a result of the applied force.

§ 1208.34 Crush test for plugs and connectors.

A force of 75 lbf (333.7 N) is to be applied gradually to the surface of the plug or connector body at a right angle to the major axis of the plug blades or receptacle cavities for a period of 1 minute. The test is to be repeated on a different sample with the compressive force applied from a direction perpendicular to the direction of the previously applied force, and also perpendicular to the major axis of the plug blades or receptacle cavities. To pass the test there must be no cracking of the plug or connector body to expose electrically live parts as determined using the probe of Figure 1, and no contact made between conductor parts of opposite polarity.

§ 1208.35 Strain relief test for plug and connector connections.

(a) With the plug or connector body securely anchored (by the blades in the case of a plug), the wires are to be pulled together steadily for 1 minute in the direction normal to the plane of the cord entrance with a force of 30 lbf (133.5 N) for No. 18 AWG wires and 20 lbf (89 N) for wires smaller in size than No. 18 AWG.

(b) If no conductor is detached and if no bare conductor is beyond the plane of the wire entry opening or can be contacted by the probe in Figure 1, the construction passes the test.

§ 1208.36 Security of insulation test at plugs and connectors.

(a) To determine that the wire insulation is secured as required, the plug or connector is to be tested with at least 6 inch (152 mm) lengths of wires.

(b) The insulation on each conductor of the wires is to be split parallel to the conductor for a short distance at a point approximately 1 inch (25.4 mm) from its entry into the plug or connector and all strands of the conductor are to be severed at the split portion. With the plug or connector body securely anchored (by the blades in the case of a plug), a direct pull of 15 lbf (66.75 N) for No. 20 AWG and larger size wires and 10 lbf (44.50 N) for wires less than No. 20 AWG is to be applied to the free ends of the wires together for 2 minutes.

(c) The test is passed if there is no detachment of the insulation from within the plug or connector, no baring of the conductors at the entry to the plug or connector that can be contacted with the probe in Figure 1, and no bare conductor beyond the plane of the wire entry opening.

§ 1208.37 Decorative part downward burning rate test.

(a) The decorative part is to be supported on a noncombustible surface in a location having an air flow no greater than 30 ft (9.14 m) per minute. With the specimen positioned so as to place one of its major surfaces in a substantially vertical plane, the uppermost edge or surface is then to be ignited through the use of any convenient open flame such as an ordinary paper bookmatch. (To facilitate ignition, in the case of molded form or figure not having an exposed edge, it may be necessary to cut a slit or opening in the desired area.) Once the decorated part is ignited, the ignition flame is to be removed and the vertical downward burning rate is to be determined by measurement of burning distance in inches and time in seconds. Usually a vertical downward burning distance of 6 inches (152 mm) is sufficient to determine the burning rate; however, in the case of parts less than 6 inches (152 mm) in height, a shorter distance may be used. Where the finished part is too small to permit determination of the vertical downward burning rate, it is necessary to test larger test specimens of the same material and minimum thickness.

(b) If repeated attempts to ignite the material fail to sustain combustion, the material is considered to comply with the requirements.

(c) Where the decorative part consists of a combination of two or more materials the burning rate is to be determined on the combination unless it is determined that each material, when tested by itself, complies with the maximum allowable burning rate.

(d) To pass the test, the vertical downward burning rate must be less than or equal to 4 inches (102 mm) per 60 seconds.

§ 1208.38 Heating test for lamps and lampholders.

A circulating-air oven maintained at a uniform temperature of no less than 248° F (120° C) is to be used for the heating test. Lampholders with non-energized lamps are to be suspended in the oven by the wires to them. Additional lampholders with non-energized lamps are to be placed in the oven on their sides on flat surface(s). After a minimum of two hours of heating, the samples are to be removed and, after cooling to room temperature, examined for exposure of electrically live parts as determined by contact with the probe in Figure 1.

§ 1208.39 Millivolts drop test for lampholders.

A lampholder is to be fitted with a lamp base in which the lamp has been replaced by a short length, not more than 1 inch (25.4 mm), of No. 30 AWG solid copper wire. The lampholder assembly is to be placed in the position of the lamp assembly shown in Figure 7. The overcurrent protective devices are to be short circuited and the current is to be increased to 135 percent of the rating of the overcurrent protective device. The voltage between the wires coming from the assembly is to be measured. To pass this test, the drop between the wire is not to exceed 200 millivolts.

§ 1208.40 Maximum wattage test for lamps.

The lamp is to be inserted into the lamp assembly shown in Figure 7. With the variable resistor at the maximum setting, connect the test circuit to the power supply. Adjust the variable resistor until the product of the current (in amperes) and the voltage across the lamp in volts is no greater than the wattage specified in § 1208.9(1). This adjustment should be completed within 60 seconds after power application. To pass this test, the lamp filament must open within two minutes after the specified wattage is achieved.

§ 1208.41 Conductive tinsel test.

(a) Metallized tinsel and other conductive flexible strips and threads, 0.25 inch (6.4 mm) and longer, and located within 1 inch (25.4 mm) of a lampholder, fuseholder, plug or connector shall be tested.

(b) Strips or threads of material shall be secured between two copper alloy clamps which are separated by not less than 0.25 inch (6.4 mm). Enough strips or threads are to be used to result in a single layer of material adding up to a total width of not less than 0.25 inch (6.4 mm).

(c) With an adjustable power supply, starting from zero, the applied voltage shall be gradually increased up to 120 volts ac.

(d) To pass the test, the material shall result in a current of less than 5 milliamperes or the material shall cause the circuit to open before this value is attained.

Subpart C—Recommendations

§ 1208.50 General materials.

Materials should be used which are appropriate to the functions of the parts they comprise.

§ 1208.51 Conductive materials.

Parts that are not electrically energized, but serve to enclose, or support, or secure enclosures of, electrically energized parts, should be of stainless steel, or plated or coated iron or steel, or otherwise protected against corrosion.

§ 1208.52 Plugs and connectors.

(a) *Faces of attachment plugs and add-on connectors.* The faces of attachment plugs and add-on connectors should be 0.75 (plus 0.0, minus 0.020) inch (19.05 (plus 0.0, minus 0.51) mm) by 1.0 (plus 0.0, minus 0.025) inch (25.4 (plus 0.0, minus 0.64) mm), with the blades centered and with a maximum 0.22 inch (5.56 mm) radius at the corners; the 1.0 inch (25.4 mm) dimension should be perpendicular to the width of the blades.

(b) *bodies of attachment plugs and add-on connectors.* The bodies of attachment plugs and add-on connectors should be of a shape that is not likely to be grasped at the periphery of the face at which the blades project, but rather is conducive to being gripped at a section formed for that purpose. The gripping area should extend over a distance of a least 0.687 inch (17.46 mm) located between two higher sections. The section at the rear should have a sharply defined projection at least 0.094 inch (2.38 mm) high, with a base of at least 0.063 inch (1.59 mm). In place of the gripping area, a finger grip in the form of a closed loop capable of accommodating fingers may be provided. Plugs and add-on connectors should not have wire(s) that projects from the plug or add-on connector in the finger grip area.

(c) *Recessed live parts.* Add-on and end connectors should have live parts within receptacle openings recessed at least 0.25 inch (6.35 mm) from the receptacle face.

(d) *Closures for receptacle openings.* Add-on connectors and end connectors should have receptacle openings that are reliably and effectively closed with insulating material. The closing means:

(1) Should, when in closed position, prevent a straight steel wire, 0.010 inch (0.254 mm) in diameter (No. 30 AWG), from touching any receptacle electric contact.

(2) Should be removable from the receptacle, but should not be removable from the string.

(3) Should be capable of normal displacement from (complete removal if appropriate), and return to (insertion if appropriate), the receptacle without breakage or damage, both before and after the connector and closing means have been conditioned for 7 hours at 158.0° F (70° C) in a circulating-air oven. The displacement and return operation after conditioning should be conducted after the parts have cooled to room temperature. If the closing means is removable from the receptacle, the conditioning should be conducted with the closing means positioned in the connector. A closing means not positioned in the receptacle should also be subjected to the conditioning.

(4) Should not impair the performance of the connector as determined after three simulated cycles of use, each cycle consisting of normal displacement and return of the closing means.

(5) Should not serve as a tab or handle that can be used to open another closing means on the connector.

(6) Should not be provided with handles, loops, knobs, or the like that might facilitate removal.

(7) Should be capable of withstanding a straight pull of no less than 1 pound applied perpendicular to the face of the receptacle, without the closure being removed from the receptacle.

(e) *Exposure of plug blades.* Receptacles should accommodate plug blades without exposure of the blades between the faces of the plug and receptacle as follows: The determination should be made using plug blades which extend out 0.718 inch (18.24 mm) from the face of the plug and after full insertion should not be accessible using a 0.010 inch (0.254 mm) thick feeler gauge whose width is not less than 0.020 inch (5.08 mm).

§ 1208.53 Recommended labeling.

(a) At least the following care and use instructions should appear as additional cautionary labeling on either a display panel of the package or on a separate notice inserted in the package to assist consumers:

(1) Instructions for testing and inspecting the light strings prior to use;

(2) Instructions for the proper replacement of bulbs and fuses;

(3) Instructions for proper storage;

(4) Special precautions for outdoor use;

(5) A cautionary message to keep young children away from light strings and bulbs;

(6) If the light string has a separate end connector receptacle, a statement indicating that only other miniature lights or decorations with miniature lights should be attached to the receptacle.

(b) The Commission regulations at 16 CFR 1500.121 (a), (c), and (d) may be used as guidance in determining the placement and conspicuousness of these statements.

(c) If the care and use instructions are provided on a separate insert notice, all information that is required by § 1208.10(c) to appear on the permanent label and packaging should also appear on the insert sheet immediately preceding the directions for use.

Interested persons are invited to submit written data, views, or arguments regarding any aspect of the proposed standard on or before July 3, 1978. Comments submitted after this date will be considered to the extent practicable. Commentors are requested to cite the specific sections of Part 1208 being commented upon and to identify the specific portions of other documents to which they refer.

The Commisssion is particularly interested in obtaining, either by written comment or by oral presentation, additional data, views, and arguments on the following matters:

(a) The degree and nature of the risk of injury the rule is designed to eliminate or reduce;

(b) The approximate number of consumer products, or types or classes thereof, subject to the rule;

(c) The need of the public for consumer products subject to such rule,

and the probable effect of such a rule upon the utility, cost, or availability of such products to meet that need;

(d) Any means of achieving the objective of the rule while minimizing adverse effects on competition or disruption or dislocation of manufacturing and other commercial practices consistent with the public health and safety;

(e) The necessity of the rule to eliminate or reduce the unreasonable risk of injury associated with the consumer products subject to the rule;

(f) Whether the rule is in the public interest;

(g) Any adverse effects that this proposed rule will have on elderly and handicapped persons;

(i) Whether the proposed effective date of the rule is reasonable and necessary.

Comments should be accompanied, to the extent possible, by supporting data or documentation. Requests for confidentiality of documentation will be handled in accordance with the Freedom of Information Act as amended (5 U.S.C. 552), the Commission's proposed interim regulations under that Act (39 FR 30298), and the provisions of section 6(a)(2) of the CPSA (15 U.S.C. 2055(a)(2)).

Written submissions and any accompanying data or material should be submitted, preferably in five copies, addressed to the Secretary, Consumer Product Safety Commission, Washington, D.C. 20207. Comments may be supported by a memorandum or brief.

Interested persons will be afforded an opportunity to make an oral presentation of data, views, or arguments on any aspect of the proposed standard on June 7, 1978, at 9:30 a.m., in the Commission hearing room, third floor, 1111 18th Street NW., Washington, D.C.

The Commission's Procedural Regulations for Oral Presentations Concerning Proposed Consumer Product Safety Rules (16 CFR Part 1109) will govern this proceeding.

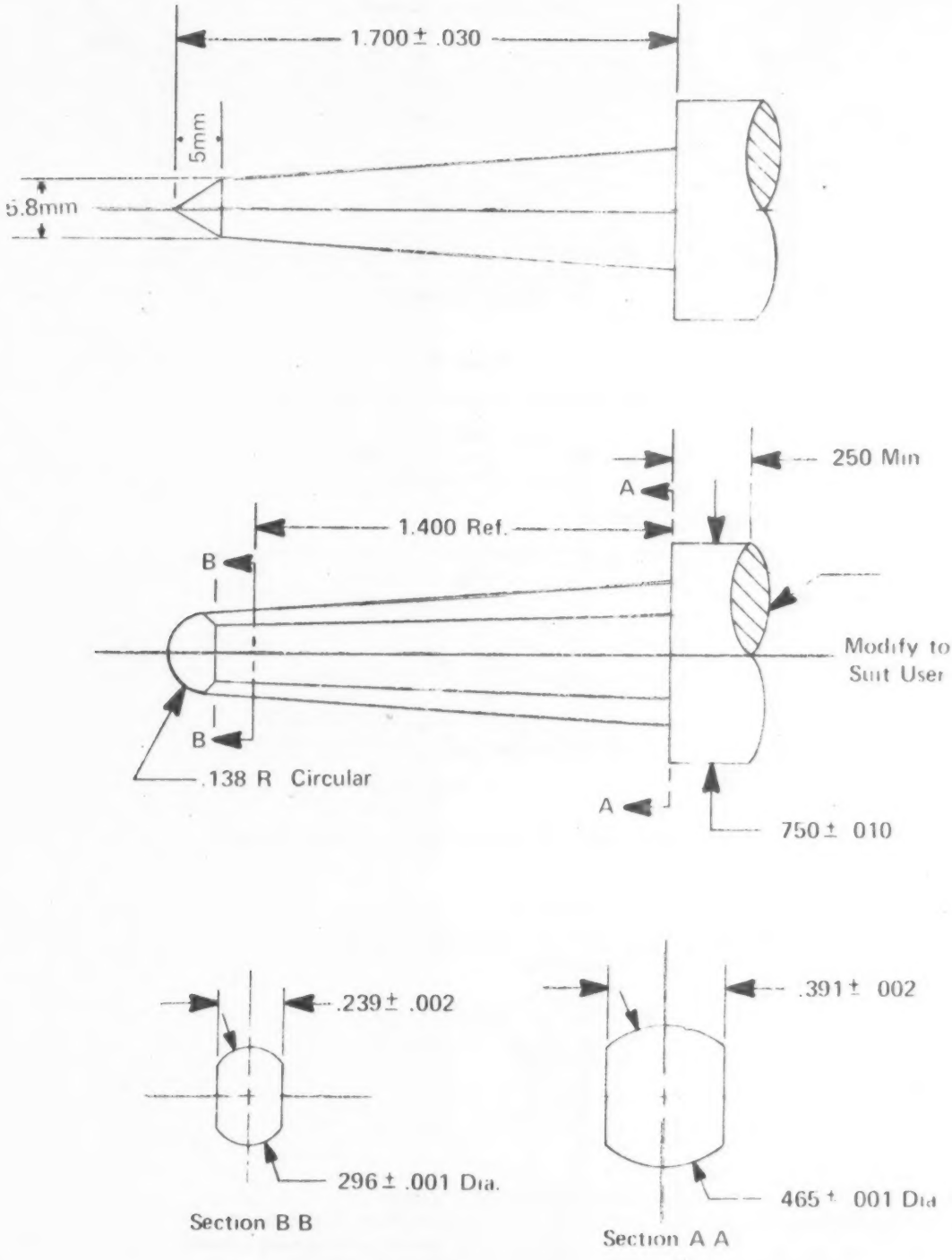
Those wishing to make oral presentations should notify the Office of the Secretary, 202-634-7700 by May 30, 1978. In addition, a summary or copy of the presentation, preferably in 5 copies is to be submitted to the Office of the Secretary by June 2, 1978.

The official transcript of the oral presentations of data, views, or arguments, any written comments that are received, and all other material which the Commission has that is relevant to this proceeding may be seen in, or copies obtained from the Office of the Secretary, third floor, 1111 18th Street NW., Washington, D.C. 20207.

Dated: April 28, 1978.

SADYE DUNN,
Acting Secretary, Consumer Product Safety Commission.

Figure 1
PROBE



Note. All dimensions are in inches unless otherwise specified

Figure 2

POSSIBLE OVERCURRENT PROTECTIVE DEVICE LOCATIONS

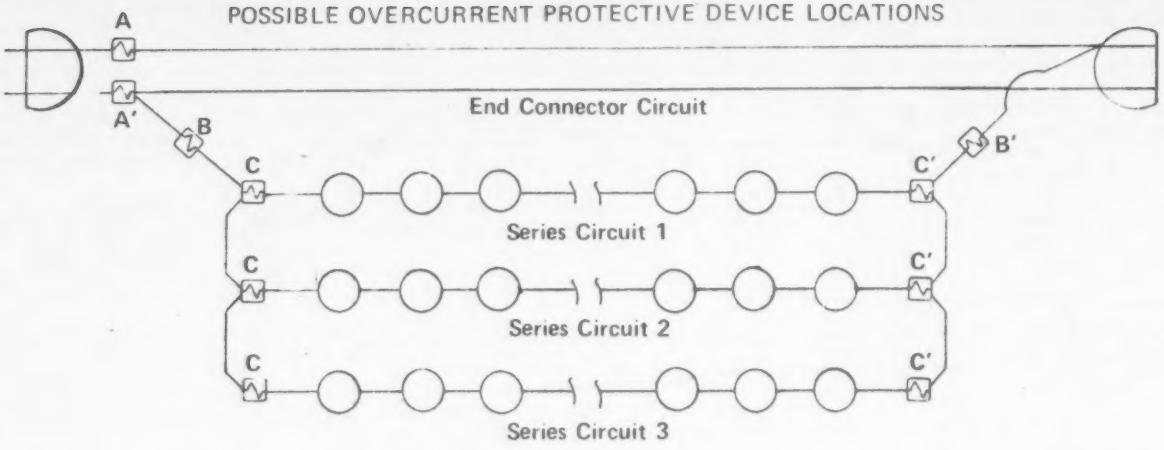
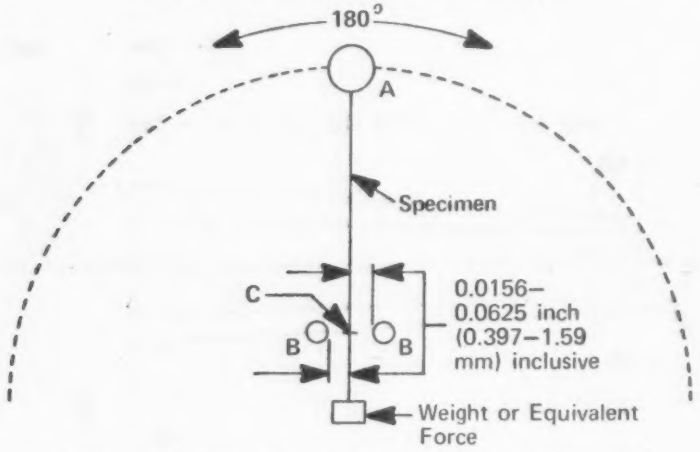


Figure 3

END VIEW OF FLEXING APPARATUS



A--Movable Rod. B--Fixed Rods. C--Point of Flexure.

Figure 4

TYPICAL TEST SET UP STRAIN RELIEF METHOD I

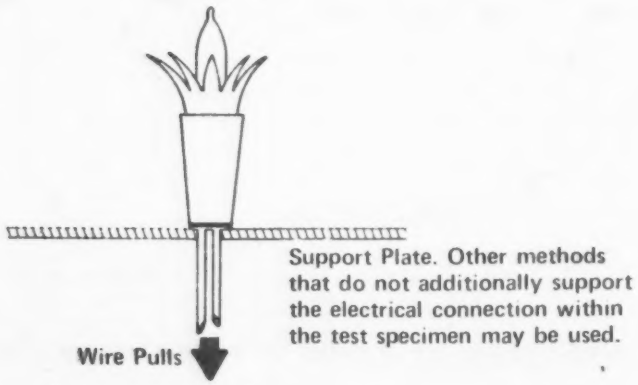

Support Plate. Other methods
that do not additionally support
the electrical connection within
the test specimen may be used.
Wire Pulls

Figure 5

TYPICAL TEST SET-UP – STRAIN RELIEF
METHOD 2

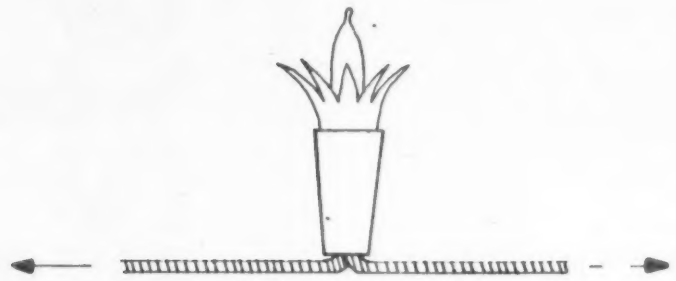
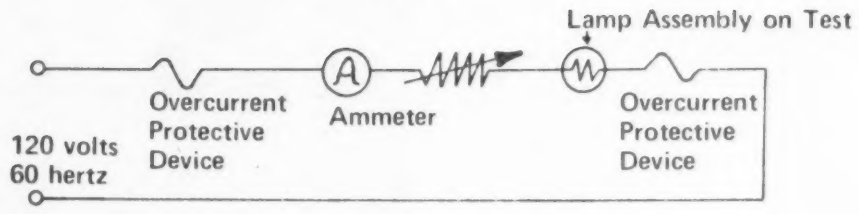
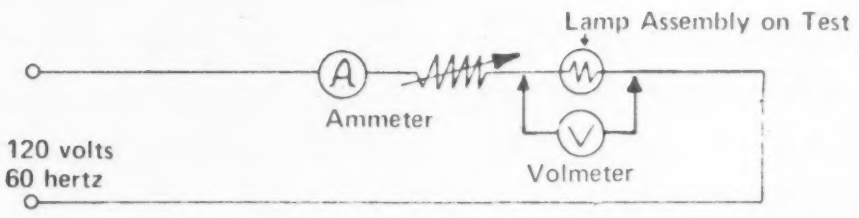


Figure 6



CASCADE FAILURE SIMULATION CIRCUIT

Figure 7



LAMP ASSEMBLY TEST CIRCUIT

[FR Doc. 78-12005 Filed 5-2-78; 8:45 am]